ENVIRONMENTAL ASSESSMENT
THE DEVELOPMENT OF A BORROW SOURCE
CAPE CANAVERAL AIR FORCE STATION
TO PROVIDE MATERIAL FOR FUTURE EMERGENCY RENOURISHMENT PROJECTS
PATRICK AIR FORCE BASE

Prepared for:

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45th Space Wing
1224 Jupiter Street
Patrick AFB, FL

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FINDING OF NO SIGNIFICANT IMPACT
FOR
DEVELOPMENT OF A BORROW SOURCE AT CAPE CANAVERAL AIR FORCE STATION
TO PROVIDE MATERIAL FOR FUTURE EMERGENCY RENOURISHMENT PROJECTS
AT PATRICK AIR FORCE BASE

INTRODUCTION/BACKGROUND

The shoreline at Patrick Air Force Base (PAFB) has been experiencing beach erosion during the past 50 years. In response to threats to military facilities and public rights-of-way, the Air Force has been replenishing beach sand first through truck-haul from upland sand sources (about 39,000 cubic yards per year [cy/yr], on annual average) from the 1970s through 1998 and in 2001 completed its first major beach replenishment by placing approximately 540,000 cy from an offshore sand source. The quality of sand from most upland sources tends to be poor and of marginal compatibility with the native beaches. Smaller scale renourishment activities required between major renourishment projects (such as that of 2001) to protect base facilities and State Route A1A from storm damage require maintenance and permitted fill limits that are not typically of sufficient volume to justify mobilization of dredge and other equipment. PAFB needs to secure an upland sand borrow source of reliable quality and beach compatibility to use for beach maintenance between these major renourishment events. The Air Force is currently permitted to perform beach restoration activities along 3.1 miles of the Atlantic Ocean shoreline at PAFB through the use of two offshore borrow areas (Permit No. 0134869-001-JC). The purpose of the proposed action is to identify an additional, reliable borrow source for the base's intermittent and emergency-response restoration/renourishment activities.

Proposed Action

The Air Force proposes developing a borrow area along the beach and dune system directly north of the Canaveral Harbor inlet, where sand has been accreting at an unnaturally high rate since construction of the inlet in 1950-1954. The Air Force proposes to designate approximately 3,600 linear feet immediately north of the Canaveral Harbor inlet as an upland borrow source for purposes of shore protection (beach erosion control) along the PAFB ocean shoreline. In general, the Air Force proposes to excavate material from across the beach face into the upland, and truck-haul and place the material on the PAFB shoreline. The proposed borrow area is located above the mean high water line. It is estimated that the proposed borrow area could produce approximately 130,000 cubic yards of material. Several haul roads would be designated between the beach and existing CCAFS roadways.

The proposed action would include excavation of the beach face, berm, and the landward face of the primary dune to, or above, the mean high water elevation. Initial excavation would also include construction of a small dune feature landward of the cut. The dune would be planted with native vegetation following construction.

No Action Alternative

Under the No Action Alternative, an additional borrow source would not be developed and existing borrow sources would remain as the sources available to provide sand for beach renourishment activities at PAFB. The beaches at the proposed project site would be expected to continue to accrete as they have for the last 50 years, and the beaches at PAFB would be expected to continue to suffer from erosion. Sand would continue to accumulate updrift of the Canaveral Harbor north jetty in response to the jetty sand-tightening and extension and in excess of that which is bypassed by the Corps' sand bypass project. In compliance with NEPA and Air Force regulations, the No Action Alternative is retained and further analyzed in the associated EA.

ANTICIPATED ENVIRONMENTAL EFFECTS

The associated EA examines the potential environmental, cultural, and socioeconomic impacts associated with the Proposed Action and No Action Alternative. Anticipated impacts associated with the proposed project primarily include impacts to biological resources and the existing beach and dune resources. A summary of anticipated impacts and mitigation requirements is included in table below.

Implementation of the proposed project would remove current native and nonnative vegetation from the project area and impact local populations of wildlife, including the federally listed southeastern beach mouse (*Peromyscus polionotus nineiventris*) and eastern indigo snake (*Drymarchon corais couperi*), and the state-listed gopher tortoise (*Gopherus polyphemus*). Sea turtles and other wildlife species also have the potential to be impacted. Impacts to species would be minimized and avoided where practicable through implementation of protection measures.

Summary of Impacts and Protection Measures

Resource Area	Proposed Action Alternative	Proposed Protection Measures	No Action Alternative
Air Quality	**Minor impacts** include vehicle emissions and wind-blown sand associated with loading, unloading, and transporting material.	Water down haul roads and cover loaded truck beds with secured geotextile fabric.	No impacts.
Noise	**Minor impacts** include additional noise associated with trucks and heavy equipment in the project area and haul route to PAFB.	None required.	No impacts.
Geology, Topography, and Soils	**Minor impacts** include sand removal from beach face as a result of excavation activities and likely shoreline recession.	Construct dune feature landward of excavation.	Continued sand accumulation updrift of the Canaveral Harbor north jetty.
Water Resources	**Minor impacts** could include minor leaks from equipment.	No refueling will occur on the beach. Spill kits will be available in refueling areas. Hydraulic lines would be inspected daily.	No impacts.

Biological Resources	**Minor impact** to vegetation communities and wildlife, including threatened and endangered species in project area. Biological resources within project area would most likely be lost in the short-term.	Survey and protection of sea turtle nests; implementation of indigo conservation/education plan; relocation of southeastern beach mice; relocation of gopher tortoises. Plant constructed dune with native vegetation to restore any lost dune communities.	No significant impacts. Brazilian pepper likely to continue spreading in project area.
Socioeconomics	**No impacts** anticipated.	None required.	No impacts.
Land Use	**No impacts** anticipated.	None required.	No impacts.
Traffic and Transportation	**Minor impact** includes additional movement of heavy equipment and trucks on roads.	None required.	No impacts.
Hazardous Materials and Waste	**Potential impacts** associated with spills.	No refueling will be allowed on the beach. Spill kits will be in place.	No impacts.
Cultural Resources	**No impact** anticipated.	None required.	No impacts.

The proposed project would also impact the existing beach and dune system in the project area. However, the equilibration effect (profile response to major storm events) is expected to be limited to the project area. The proposed small dune to be constructed along the landward edge of the borrow area is not predicted to be undercut or significantly overwashed by the equilibrium storm event. The beach system in the project area would be expected to continue to be a dynamic environment, with or without implementation of the proposed project.

All permits and/or documents required by the U.S. Fish and Wildlife Service (FWS) or the State would be obtained prior to project implementation. The Air Force has completed Formal section 7 Consultation with FWS. It was the opinion of the FWS that the proposed project would not likely jeopardize the continued existence of federally listed species provided the Air Force complied with terms and conditions contained within the Biological Opinion.

CONCLUSION

Based upon my review of the facts and analyses contained in the attached EA, conducted in accordance with provisions of NEPA, the council on Environmental Quality regulations, and 32 CFR 989, I conclude that the proposed action will not have significant impacts, either by itself or cumulatively with other ongoing projects at Cape Canaveral Air Force Station. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact completes the environmental impact analysis process.

SUSAN J. HELMS
Brigadier General, USAF
Commander

6 Sep 07
Date

EXECUTIVE SUMMARY

The shoreline at Patrick Air Force Base (PAFB) has been experiencing beach erosion during the past 50 years. In response to threats to military facilities and public rights-of-way, the Air Force has been replenishing beach sand first through truck-haul from upland sand sources (about 39,000 cubic yards per year [cy/yr], on annual average) from the 1970s through 1998 and in 2001 completed its first major beach replenishment by placing approximately 540,000 cy from an offshore sand source. The quality of sand from most upland sources tends to be of poor quality and of marginal compatibility with the native beaches. Smaller scale renourishment activities required between major renourishment projects (such as that of 2001) to protect base facilities and State Route A1A from storm damage require maintenance and permitted fill limits that are not typically of sufficient volume to justify mobilization of dredge and other equipment. PAFB needs to secure an upland sand borrow source of reliable quality and beach compatibility to use for beach maintenance between these major renourishment events. The Air Force is currently permitted to perform beach restoration activities along 3.1 miles of the Atlantic Ocean shoreline at PAFB through the use of two offshore borrow areas (Permit No. 0134869-001-JC). The purpose of the proposed action is to identify an additional, reliable borrow source for the base's intermittent and emergency-response restoration/renourishment activities.

Potential upland sources include commercial sand sources and sand sources located at Cape Canaveral Air Force Station (CCAFS), including the Trident Basin West Spoil Area, Trident Basin East Spoil Area, and an area directly north of the Canaveral Harbor inlet. Because commercial sand sources generally do not match existing beach sand and tend to be costly, they are not a desirable alterative. PAFB has used the Trident Basin West Spoil Area in the past, but the remaining sand is difficult to remove due to the presence of fine-grained soils and potential environmental concerns. Material from the East Trident Basin East Spoils Area is likely to be incompatible with beach sands. Therefore, PAFB desires to develop the area directly north of the Canaveral Harbor inlet as an upland sand borrow source.

The Air Force proposes developing a borrow area along the beach and dune system directly north of the Canaveral Harbor inlet, where sand has been accreting at an unnaturally high rate since construction of the inlet in 1950-1954. The proposed borrow site is located on CCAFS directly north of Canaveral Harbor. Since construction of the entrance channel and jetties in the early 1950s, the beach north of the jetty has accreted seaward approximately 500-1,000 feet. The proposed action would include excavation of the beach face, berm, and the landward face of the primary dune to, or above, the mean high water elevation. Initial excavation would also include construction of a small dune feature landward of the cut. The dune would be planted with native vegetation following construction.

This Environmental Assessment (EA) examines the potential environmental impacts associated with the Proposed Action and No Action Alternative. Anticipated impacts associated with the proposed project primarily include impacts to biological resources and the existing beach and dune resources. A summary of anticipated impacts and mitigation requirements is included in **Table ES-1.**

Implementation of the proposed project would remove current native and nonnative vegetation from the project area and impact local populations of wildlife, including the federally listed southeastern beach mouse and the state-listed gopher tortoise. Sea turtles and other wildlife species also have the potential to be impacted. Impacts to listed species would be minimized and avoided where practicable and measures to reduce impacts would be implemented.

Table ES-1 Summary of Impacts and Protection Measures

Resource Area	Proposed Action Alternative	Proposed Protection Measures	No Action Alternative
Air Quality	**Minor impacts** include vehicle emissions and wind-blown sand associated with loading, unloading, and transporting material.	Water down haul roads and cover loaded truck beds with secured geotextile fabric.	No impacts.
Noise	**Minor impacts** include additional noise associated with trucks and heavy equipment in the project area and haul route to PAFB.	None required.	No impacts.
Geology, Topography, and Soils	**Minor impacts** include sand removal from beach face as a result of excavation activities and likely shoreline recession.	Construct dune feature landward of excavation.	Continued sand accumulation updrift of the Canaveral Harbor north jetty.
Water Resources	**Minor impacts** could include minor leaks from equipment.	No refueling will occur on the beach. Spill kits will be available in refueling areas. Hydraulic lines would be inspected daily.	No impacts.
Biological Resources	**Minor impact** to vegetation communities and wildlife, including threatened and endangered species in project area. Biological resources within project area would most likely be lost in the short-term.	Implement sea turtle, eastern indigo snake, southeastern beach mouse, and gopher tortoise protection measures in accordance with BO. Plant constructed dune with native vegetation to restore any lost dune communities.	No significant impacts. Brazilian pepper likely to continue spreading in project area.
Socioeconomics	**No impacts** anticipated.	None required.	No impacts.
Land Use	**No impacts** anticipated.	None required.	No impacts.
Traffic and Transportation	**Minor impact** includes additional movement of heavy equipment and trucks on roads.	None required.	No impacts.
Hazardous Materials and Waste	**Potential impacts** associated with spills.	No refueling will be allowed on the beach. Spill kits will be in place.	No impacts.
Cultural Resources	**No impact** anticipated.	None required.	No impact.

The proposed project would also impact the existing beach and dune system in the project area. However, the equilibration effect (profile response to major storm events) is expected to be limited to the project area. The proposed small dune to be constructed along the landward edge of the borrow area is not predicted to be undercut or significantly overwashed by the equilibrium storm event. The beach system in the project area would be expected to continue to be a dynamic environment, with or without implementation of the proposed project.

The Air Force has completed Formal Section 7 Consultation with the U. S. Fish and Wildlife Service (FWS). It was the opinion of the FWS that the proposed project would not likely jeopardize the continued existence of federally listed species provided the Air Force complied with the terms and conditions contained within the Biological Opinion.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AFI	Air Force Instruction
CAA	Clean Air Act, as amended
CCAFS	Cape Canaveral Air Force Station
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
cy	Cubic yards
cy/yr	Cubic yards per year
dB	Decibels
dBA	A-weighted decibel scale
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FNAI	Florida Natural Areas Inventory
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FSBP	(Cape Canaveral) Federal Sand Bypass Project
ft/yr	Foot (feet) per year
FWCC	(Florida) Fish and Wildlife Conservation Commission
INRMP	Integrated Natural Resources Management Plan
KSC	Kennedy Space Center
MBTA	Migratory Bird Treaty Act
MHHW	Mean Higher High Water
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MSL	Mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
Olsen	Olsen Associates, Inc.
PAFB	Patrick Air Force Base
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SCS	Soil Conservation Service
URTD	Upper Respiratory Tract Disease
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds

1.0 OVERVIEW

1.1 Introduction

The Air Force is currently permitted to perform beach restoration activities along the beaches at Patrick Air Force Base (PAFB). Although off-shore borrow areas are permitted (the permit designates two areas off of Cape Canaveral Air Force Station [CCAFS] as sand borrow sites), the Air Force proposes developing an upland borrow site at CCAFS. The proposed borrow site is located along the beach and dune system directly north of the Canaveral Harbor inlet. Sand from the upland borrow site would be used for emergency renourishment activities along the beaches at PAFB. A vicinity map is provided as **Figure 1**.

The Canaveral Harbor and inlet were constructed during 1950-1954. Historical shoreline data from 1878, 1929, and 1949 indicate that the proposed borrow area exhibited net accretion (or natural accumulation of sand) over the years prior to the construction of Canaveral Harbor. The area north of the inlet generally accreted at a rate of approximately 10 feet per year (ft/yr), while the shoreline south of the inlet (extending approximately 8 miles) advanced seaward at rates of approximately 2 to 6 ft/yr. Accretion at rates less than 1 ft/yr then extended for another 8 to 12 miles to the south (Kriebel *et al.*, 2002).

Data indicate that accretion patterns changed significantly following inlet construction. North of the inlet, post inlet accretion rates have been measured as 20 to 23 ft/yr on average, or more than 13 ft/yr greater than pre-inlet conditions (Olsen, 1992). South of the inlet, beaches have shown a general reversal in the pre-inlet accretion trends, with net erosion following inlet construction. This erosion is most pronounced in the first 8 to 10 miles south of the inlet and is less significant further to the south. Modeling suggests that the shoreline would have remained accretional for a distance 15 to 20 miles south of the inlet location due to Cape migration (or the natural long-shore movement of sand southward) if the inlet had not disrupted natural shoreline processes. Continuing another 5 to 10 miles south, the shoreline would have been relatively stable with little net change expected due to Cape migration. An independent coastal expert study commissioned by the U.S. Army Corps of Engineers (USACE) concluded that the erosional effect of the Canaveral Harbor Federal Navigation Project extends 10 to 15 miles south of the inlet, including the PAFB shoreline (Kriebel *et al.*, 2002).

Kriebel *et al.* (2002) suggests that the average pre-inlet net longshore transport rate at the inlet location was approximately 210,000 cubic yards per year [cy/yr] moving in a southward direction. Since inlet construction, this sand has been partially blocked by the north jetty, deposited on the updrift beaches (i.e., beaches north of the inlet), and partially intercepted by the deep navigation channel (Kriebel *et al.*, 2002). In the absence of the inlet, this material would have been mostly transported and deposited on beaches south of the inlet. Therefore, this area directly north of the Canaveral Harbor inlet provides naturally occurring, suitable sands that are compatible with beaches further south (i.e., beaches along PAFB that consistently suffer from erosion).

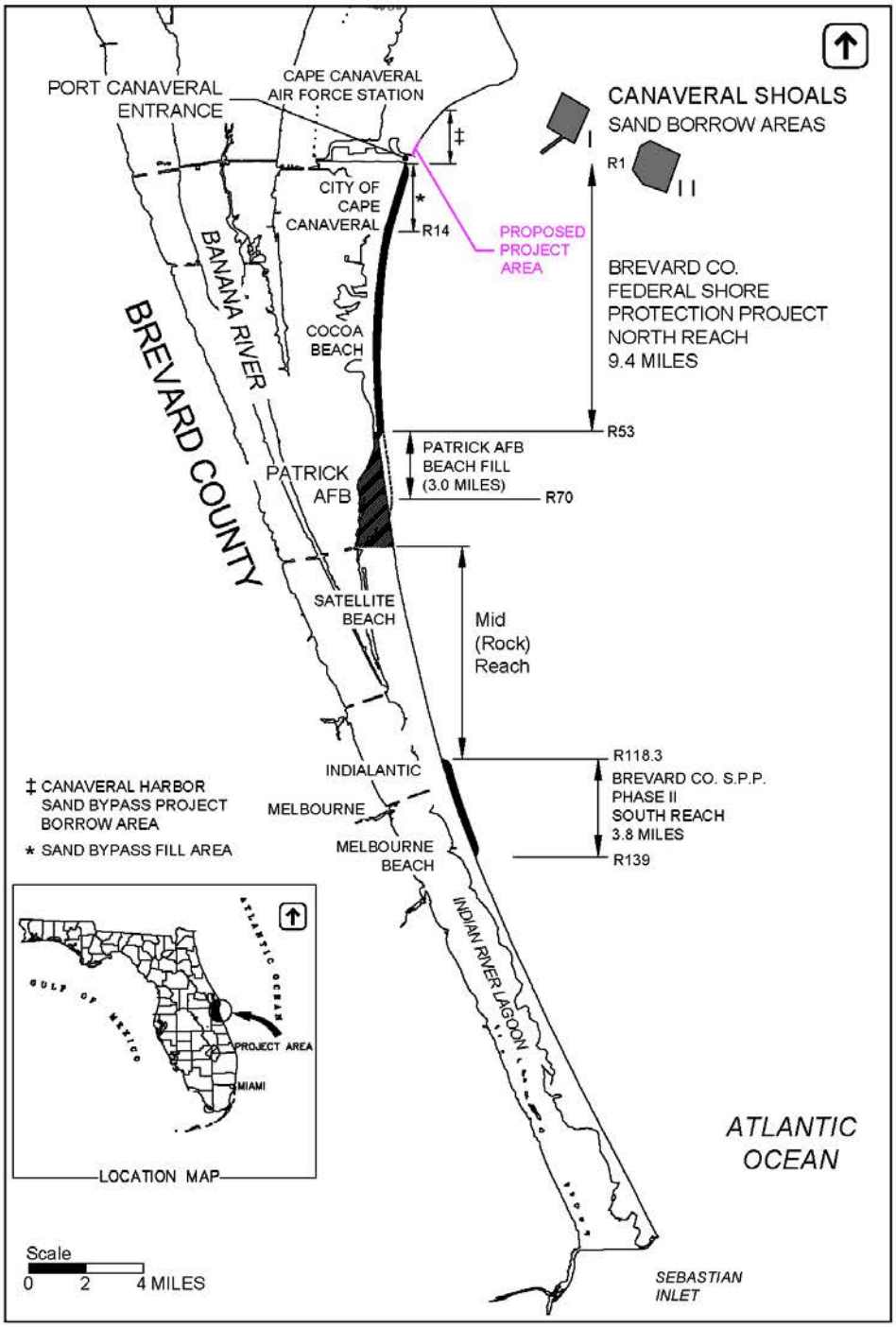

Figure 1: Vicinity Map of Project Area; Brevard County, Florida

The proposed sand borrow site is also directly affected by the USACE Canaveral Harbor Federal Sand Bypass Project. This project includes the periodic dredging (approximately every 6 years) of the near-shore area north of the Canaveral Harbor Entrance and piping the material to beaches up to 2 to 3 miles south of the Canaveral Harbor Entrance. The sand is placed on the beach as a slurry discharge from the pipeline and shaped with heavy equipment. The next sand bypass event is anticipated to occur between November 2007 and April 2007. The purpose of the bypassing operation at Canaveral Harbor is to reduce maintenance dredging within the navigation channel, to reduce downshore erosion impacts due to the harbor improvement, and to transport littoral sand to the south beaches, which would occur naturally in the absence of the port. The project, authorized by Congress in 1962 and first implemented in 1995, bypasses the equivalent of 156,000 cy/yr (viz., 936,000 cy/yr every six years) as an integral part of the federal navigation project.

Physical monitoring of the sand bypass borrow area since 1995 indicates that the beach recovers sand at an average rate of 220,000 cy/yr (Bodge & Howard, 2003). Therefore, it has been observed and calculated that the proposed borrow area continues to experience a net gain of sand at a rate of 64,000 cy/yr despite the bypass activities.

The USACE sand-tightened and extended the inlet's north jetty by 300 feet in 2005. This action was anticipated to impound additional sand immediately north of the inlet. This action was also intended to decrease maintenance dredging requirements of the federal channel and to increase the availability and recovery of sand for bypassing to the beaches south of the inlet (USACE, 2003).

1.2 Purpose and Need

The shoreline at PAFB has been experiencing beach erosion during the past 50 years. In response to threats to military facilities and public rights-of-way caused by significant beach erosion, the Air Force has replenished beach sand first through truck-haul from upland sand sources (about 39,000 cy/yr, on annual average) from the 1970s through 1998, and in 2001 completed its first major beach replenishment by placing approximately 540,000 cy from an offshore sand source. The quality of sand from some of these upland sources was relatively poor and of marginal compatibility with native beach sand. Further, smaller scale renourishment activities are required between major renourishment projects to protect base facilities and State Route A1A from storm damage. Maintenance activities and permitted fill limits are not typically of sufficient size to mobilize hopper dredges and other large equipment required to obtain materials from the permitted off-shore borrow areas. Physical monitoring surveys indicate that some renourishment sand drifts southward from the Brevard County Federal Shore Protection Project (North Reach) immediately updrift of PAFB; however, the magnitude of these drifts is not necessarily sufficient to mitigate erosion along PAFB that has historically been exacerbated by severe storm events. Therefore, it is necessary that PAFB secure an upland sand borrow source of reliable quality and beach-compatibility for this purpose. Having a ready and accessible sand source already permitted and developed would enable PAFB to provide emergency response to beach erosion caused by major storm events.

The Air Force is currently permitted to perform beach restoration activities along 3.1 miles of the Atlantic Ocean shoreline in Brevard County, extending from the northern boundary of PAFB (at the Department of Environmental Protection's reference monument R-53) southward to monument R-70 near the tracking facility at the base (Permit No. 0176167-001-JC). The Air Force is also permitted to use two offshore borrow areas to provide sand for such renourishment activities (Permit No. 0134869-001-JC). The purpose of the proposed action is

to secure an upland borrow source of reliable quality and compatibility for the base's intermittent and emergency-response restoration/renourishment activities. Implementation of the proposed action would provide another mechanism (in addition to the Canaveral Harbor Federal Navigation Project) to enable accreted sand north of the Canaveral Harbor jetty to bypass the inlet and replicate the sand's natural long-shore drift southward.

1.3 Authority

In accordance with the National Environmental Policy Act of 1969 (NEPA, 42 USC 4321 *et seq.*), federal agencies are required to take into consideration potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee federal policy in this process. The CEQ subsequently issued *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] § 1500-1508). These regulations specify that an Environmental Assessment (EA) be prepared to:

- briefly provide sufficient analysis and evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a finding of no significant impact (FONSI);
- aid in an agency's compliance with NEPA when no EIS is necessary; and
- facilitate preparation of an EIS when one is necessary.

To comply with NEPA and other pertinent environmental requirements, such as the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA), and to assess impacts on the environment, the decision-making process includes a study of environmental issues related to the use of CCAFS as a sand borrow source for PAFB. This EA is written in compliance with the NEPA, CEQ regulations (CFR 1500-1508), and Air Force regulations instructing the implementation of NEPA for Air Force actions (Environmental Impact Analysis Process [32 CFR Part 989]).

2.0 DESCRIPTION OF PROPOSED ACTIONS AND ALTERNATIVES

In 1997, Olsen Associates, Inc. (Olsen) conducted a study of potential sand borrow sources in the general area of PAFB, titled *Sand Source Study for Storm Barrier Reconstruction Along Patrick Air Force Base, Florida* (Olsen, 1997). This report provides a summary of various potential sand sources in the area including commercial sand sources, the Trident Basin West Spoil Area, and CCAFS directly north of the Port Canaveral North Jetty. This report was used to develop the proposed action and alternatives.

2.1 Proposed Action

The Air Force proposes to designate approximately 3,600 linear feet immediately north of the Canaveral Harbor inlet as an upland borrow source for purposes of shore protection (beach erosion control) along the PAFB ocean shoreline (**Figure 1**). The proposed borrow site is located directly north of the Canaveral Harbor jetty as shown in **Figure 2**. In general, the Air Force proposes to excavate material from across the beach face into the upland, and truck-haul and place the material on the PAFB shoreline. The proposed borrow area is located above the mean high water line. It is estimated that the proposed borrow area could produce approximately 130,000 cubic yards of material. Several haul roads would be designated between the beach and existing CCAFS roadways. Justification for the transfer of this sand directly to PAFB is affirmed by the preliminary findings of the congressionally mandated independent expert study (Kriebel *et al.* 2002), which confirmed that the littoral impacts of Canaveral Harbor extend to and beyond the PAFB ocean shoreline.

Based on need for beach fill material, the Air Force would begin borrowing material from the south end of the proposed borrow area and move northward. **Figure 3** illustrates areas of potential impact with respect to the amount of borrow material required. The platform width of excavation would be approximately 150 to 340 feet.

Figure 4 depicts the proposed excavation (cut) profile. This profile consists of a 1% slope extending landward from the mean high-water line, intersected by a 10% slope extending seaward from the landward limit of cut. The landward limit of cut varies along the project platform. The northern limit of cut is determined by the total volume of material required, up to approximately 130,000 cubic yards.

The proposed action also includes the construction of a dune feature with a seaward toe located approximately 15 to 20 feet behind the landward limit of cut. The dune would be constructed with 25% side slopes and a crest width between 3 and 15 feet, and with elevation between +8 feet to +13 feet, National Geodetic Vertical Datum (NGVD). This dune would be on the order of 5 feet high and 2 to 3 cy/ft alongshore. The dune feature would be constructed from the upper 6 to 12 inches of material initially removed from the borrow area; i.e., that material which includes vegetation, roots, or other organics that are generally not suitable for relocation to PAFB as beach fill placement. This dune's purpose would be to offset impacts due to wave overwash that could occur as a result of the sand bypass project operations and which would be increased by the proposed excavation.

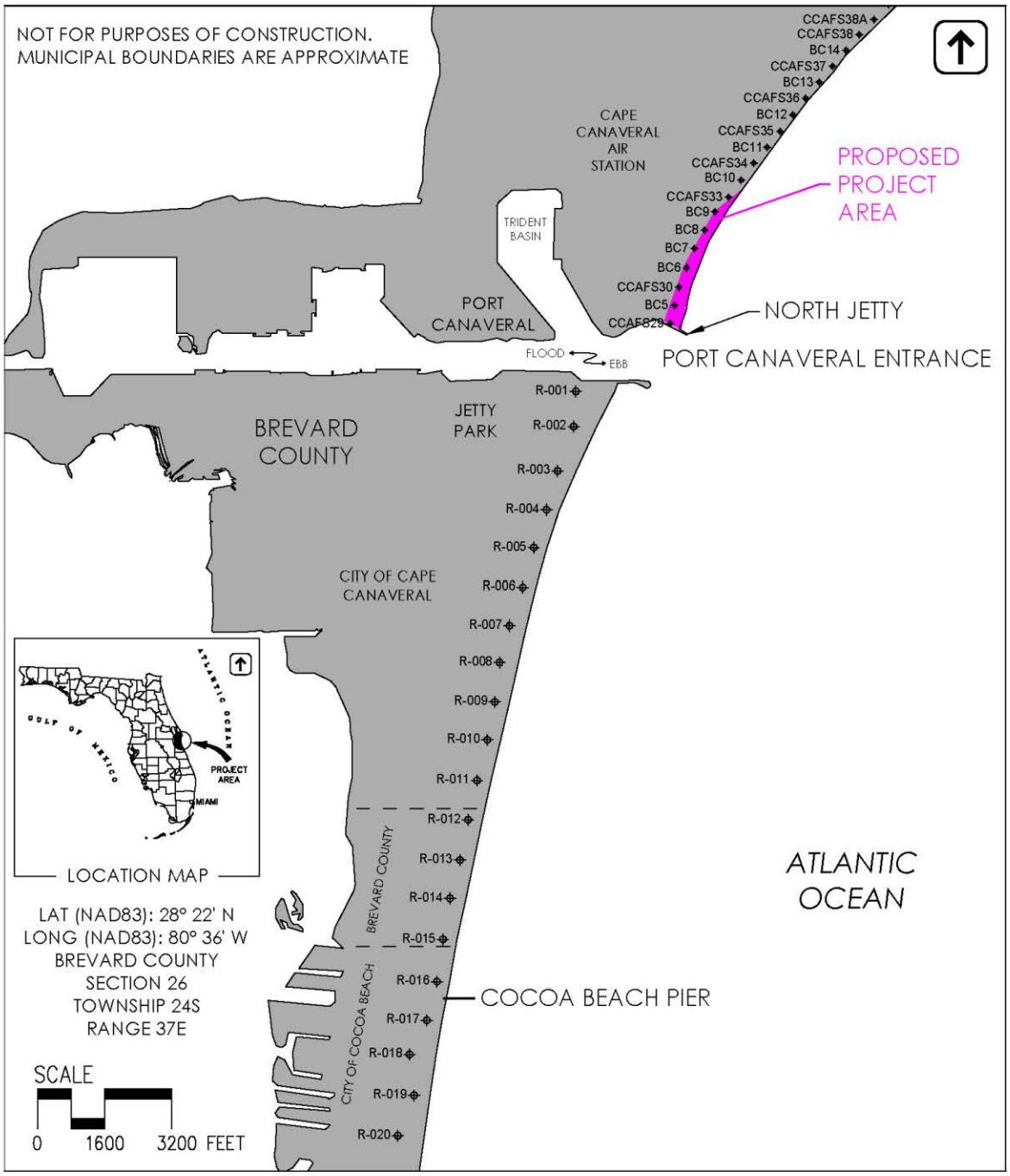

Figure 2: Location Map of Upland Sand Borrow Area, Cape Canaveral Air Force Station

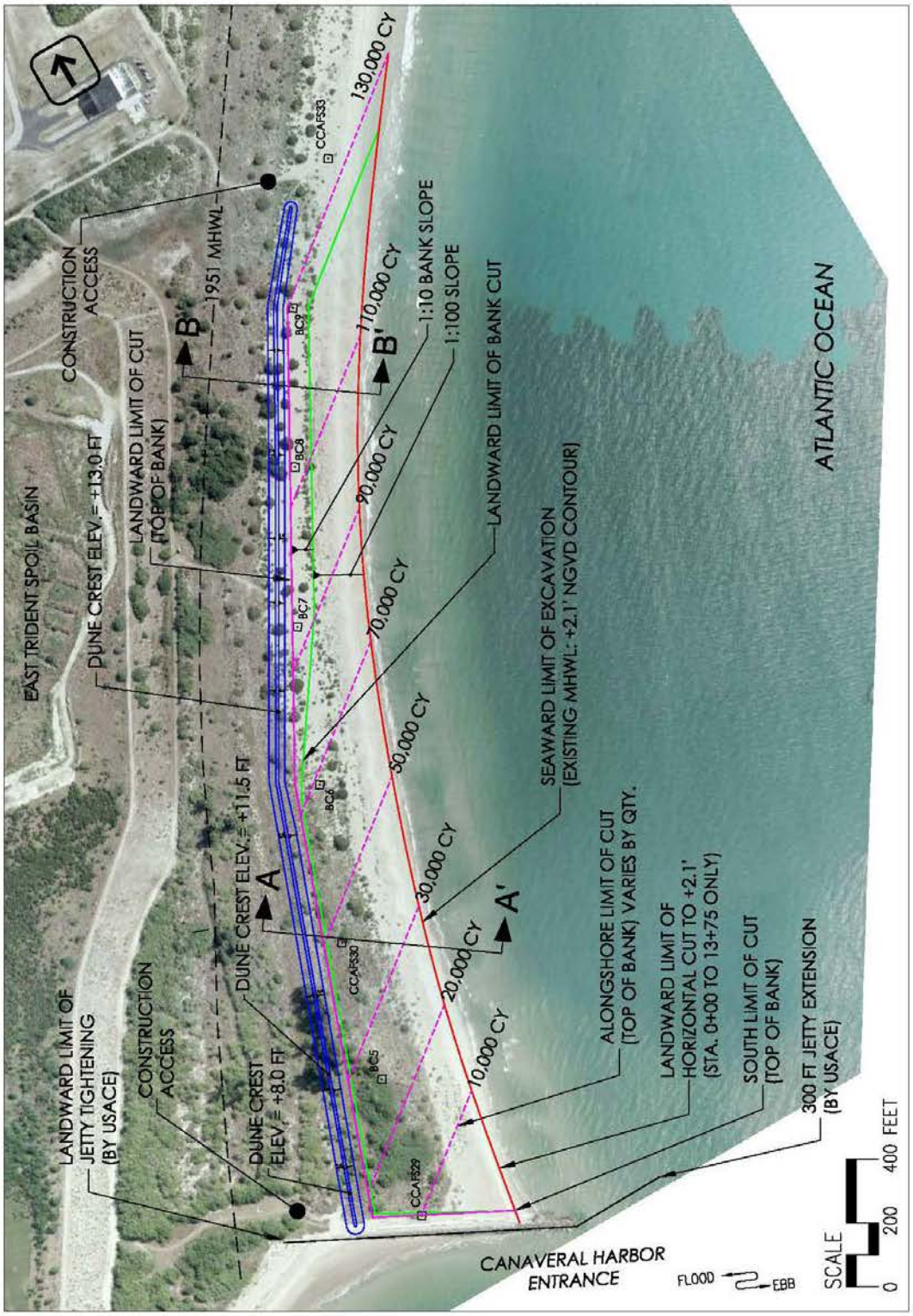

Figure 3: Plan View of Project Borrow Area North of Canaveral Harbor Entrance

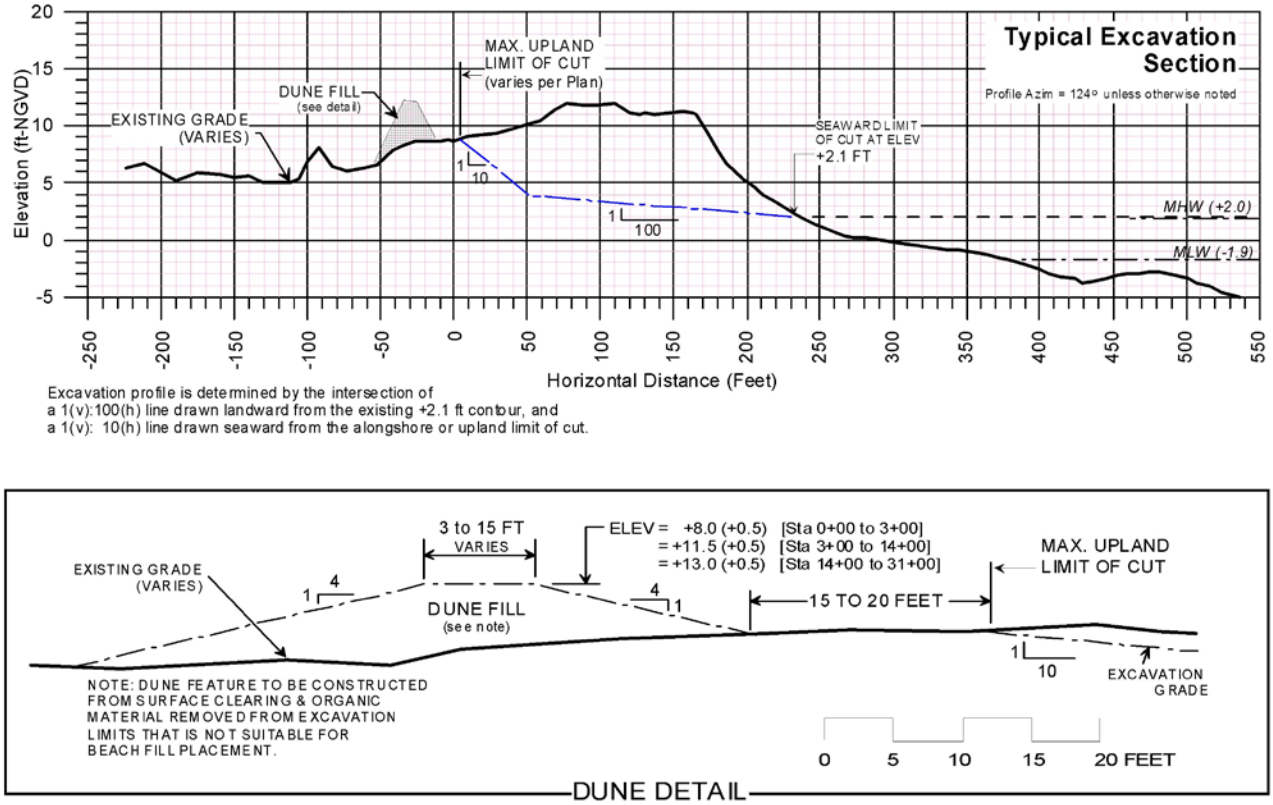

Figure 4: Sections and Detail of Excavation within the Project Borrow Area

In the event the need arises to renourish beaches on PAFB, the primary components of the proposed action are outlined as follows:

1) The quantity of required material would be identified, between 10,000 and 130,000 cubic yards. The project borrow area would be surveyed to identify current conditions. The limits of excavation within the project borrow area, beginning from the south end (at the jetty), would be computed from the survey in order to develop the required borrow quantity. For example, from **Figure 3**, if 30,000 cy of material were required, approximately 7 acres would be directly impacted.
2) Within the 'work area' (i.e., that required to supply the borrow material), vegetation would be cleared. The upper 6 to 12 inches of soil containing roots or other organics (unsuitable for beach fill placement) would be graded off and pushed to the landward limit of the borrow area to create the dune.
3) Sand within the work area would be mechanically excavated and placed in dump trucks for transport to the PAFB beach fill area. Truck access to and from the work area would be along two paths designated in **Figure 3**. Geogrid temporarily placed along these paths would stabilize the grade for truck access. Based on potential need, no more than 13 trucks at any one time would transport the borrow sand from CCAFS to PAFB. Through CCAFS and on PAFB, the trucks would use existing streets capable of supporting the truck weights; between the two installations, trucks would use State Route A1A.

4) The work area would be finish-graded to the lines and slopes indicated in **Figure 4**. The dune created along the landward edge of the work area would be planted with native dune vegetation.

In summary, the proposed action would include excavation of the beach face, berm, and the landward face of the primary dune to, or above, the mean high water elevation. Initial excavation would also include construction of a small dune feature landward of the cut.

2.2 Description of Alternatives

2.2.1 Commercial Sites Alternative

Beach compatible sand may be obtained from upland quarries in the vicinity of PAFB (Olsen, 1989; 1997). Upland sand sources have been utilized in the past for storm barrier reconstruction (beach fill) along the PAFB shoreline; however, the quality of some of this sand has been very poor, and the significant cost of purchasing and transporting the material often obviates its physical benefit and fiscal practicality. Despite mineralogic and grain size analyses that initially indicated acceptable beach compatibility, some upland sand purchased and placed on the PAFB shoreline in the past became semi-lithified and resulted in steep escarpments and adverse impacts to marine turtle nesting. This situation caused the 45th Space Wing to introduce new/additional sand onto the site and mix the two materials to achieve sea turtle nesting compatibility. Commercial sand sources have not reliably matched the native beach sand, are costly, and typically located at significant distance from PAFB; accordingly, their use is not desired. Therefore, this alternative is not carried forward for analysis in this EA.

2.2.2 Trident Basin West Spoil Area Alternative

PAFB has used the Trident Basin West Spoil Area in the past; but there is little remaining sand of beach quality. In addition, the sand that remains is difficult to remove due to the proximity of interlaced fine-grained soils and potential environmental concerns. About 385,000 cubic yards of beach compatible material were initially identified within portions of the West Spoil Area of the Canaveral Harbor Trident Basin (Olsen, 1997). Approximately 165,000 cubic yards of this material were excavated and placed along the PAFB shoreline in 1998. The remainder of the material was found to be mostly interbedded or over-burdened with non-beach compatible dredge spoils (silt, clay, organics), and was deemed to be infeasible to access or segregate for use as suitable beach fill. Therefore, the Trident Basin West Spoil Area Alternative is not carried forward for analysis in this EA.

2.2.3 Trident Basin East Spoil Area Alternative

The East Spoil Area of the Canaveral Harbor Trident Basin has been routinely used for disposal of dredged materials from the inner basins of the harbor, almost all of which is characterized by muds, silts and clays. Deposits of potentially beach-compatible sand in the East Spoil Area are limited, intermixed with non-suitable soils, and infeasible for beach fill use; therefore, the Trident Basin East Spoil Area Alternative is not carried forward for analysis in this EA. Also, the presence of extensive vegetation, including exotics, would make this alternative cost prohibitive.

2.2.4 Offshore Borrow Areas Alternative

Seabed sand sources offshore of PAFB include Space Coast Shoals I and II. Test dredging and intensive geotechnical study of the former area indicated that it was not suitable for beach

fill use, and the Space Coast Shoals I area was therefore abandoned (Olsen, 2001). The latter area, Space Coast Shoals II, was completely dredged for initial construction of the Brevard County Federal Shore Protection Project (South Reach) in 2001-02 and is depleted (Olsen, 2003a). Minor isolated deposits of sand may exist in the vicinity of Space Coast Shoals; however, because of the marginally suitable sand quality and irregular and small areas of deposition, further development of sand sources in this area is not presently recommended (Olsen, 2003a).

Other permitted offshore borrow areas for beach nourishment in Brevard County have been identified and permitted, and include Canaveral Shoals I and II offshore of Cape Canaveral. The latter was utilized for the 2000-01 beach nourishment construction of the Brevard County Federal Shore Protection Project (North Reach) and PAFB. These sources contain significant quantities (>20 million cubic yards) of beach compatible sand.

Use of offshore borrow areas for the proposed emergency beach fill actions at PAFB is not feasible. Dredging and placement from these borrow areas requires large ocean-certified dredges and pipelines, for which the initial mobilization cost exceeds $1,000,000. For this reason, use of this equipment (and offshore borrow areas) is fiscally restricted to projects involving millions of cubic yards of sand, and requiring many millions of dollars. This far exceeds the proposed activity, which would involve less than 130,000 cubic yards of sand at any given time. Also, these dredges are scheduled months/years in advance and cannot respond quickly to an emergency situation. To the extent that funds are available, PAFB can 'piggy-back' on offshore dredging and beach fill activities undertaken along the adjacent Brevard County shoreline (as was accomplished for the 2000-01 beach fill); however, the Brevard County activity is limited to minimum 6-year renourishment cycles, per scheduling and funding capabilities of the USACE. These activities may or may not coincide with emergency beach erosion control measures required along PAFB. Instead, the proposed project is intended to provide a readily available, small-scale sand source for such beach fill requirements at PAFB. Since the Offshore Borrow Areas Alternative does not fulfill the needs of the project, it is not carried forward for analysis in this EA.

2.2.5 Canaveral Harbor Federal Sand Bypass Project Alternative

Use or expansion of the Canaveral Harbor Federal Sand Bypass Project for the proposed activity is not physically feasible. To implement the sand bypass project, the USACE mobilizes a cutterhead pipeline dredge to transfer approximately 936,000 cubic yards of sand from north of the Canaveral Harbor inlet to south of the inlet at six-year intervals. The permit for the project allows sand to be placed on the beach within approximately 2.4 miles south of the inlet. However, pending permits would extend the fill area up one mile further south. Extending the fill placement further southward to PAFB would require an additional 6 to 9 miles of pipeline. This pipeline length is neither economically nor physically viable.

Use of a hopper dredge to remove sand from the USACE's bypass borrow area and then transfer it to PAFB is likewise infeasible. The shallow water depths and location within the surf zone do not allow operation of an ocean certified hopper dredge at the borrow area.

This alternative includes the USACE's cutterhead pipeline dredge to discharge sand from the borrow area, via a 'spider barge', to ocean-going scows that would be towed to PAFB. The sand would be pumped from the scows, via an 'offloader' and pipeline, to the PAFB beach. Like the use of offshore borrow areas, this alternative entails large mobilization costs that are not economically viable for the small sand fill quantities that are proposed.

Physically, the cutterhead-dredge and pipeline utilized for the sand bypass project cannot place sand further south in to order reach the PAFB shoreline. The typically small scale requirements for beach fill along PAFB, and the typically limited available funding, realistically preclude mobilizing a hydraulic dredge to place sand at PAFB from offshore sand sources or the sand bypass borrow area. Therefore, the Canaveral Harbor Federal Sand Bypass Project Alternative is not carried forward for analysis in this EA.

2.2.6 Armament Alternative

To stabilize the beaches of PAFB, the Air Force could armor the beaches with riprap. Beach armament is generally costly and often increases erosion on adjacent beaches. In addition, beach armoring generally reduces sea turtle nesting potential. Because of this, the State of Florida and Brevard County have restricted beach armament to protection of critical infrastructure in imminent danger of collapse. Based on these factors, this alternative has been eliminated from further analysis and is not considered to be a viable or feasible alternative.

2.2.7 No Action Alternative

Under the No Action Alternative, an additional borrow source would not be developed and existing borrow sources would remain as the sources available to provide sand for beach renourishment activities at PAFB. The proposed project area would remain in a similar state as it is described in **Section 4.0**. The beaches at the proposed project site would be expected to continue to accrete as they have for the last 50 years, and the beaches at PAFB would be expected to continue to suffer from erosion. Sand would continue to accumulate updrift of the Canaveral Harbor north jetty in response to the jetty sand-tightening and extension (USACE, 2003) and in excess of that which is bypassed by the Corps' sand bypass project. In compliance with NEPA and Air Force regulations, the No Action Alternative is retained and further analyzed in this EA.

3.0 AFFECTED ENVIRONMENT FOR PROPOSED ACTION

This section describes relevant existing environmental conditions for resources potentially affected by the proposed action and identified alternatives. In accordance with guidelines established by NEPA, CEQ regulations, and Air Force Instruction (AFI) 32-7061, *The Environmental Analysis Process*, the description of the affected environment focuses on only those aspects potentially subject to impacts.

In the case of the proposed action at CCAFS, the affected environment description is limited primarily to the proposed borrow site and its immediate vicinity due to the focused scope of the action. Resource descriptions focus on the following areas: climate and oceanography; air quality; noise; geology, topography, and soils; water resources; biological resources; socioeconomics and land use; traffic and transportation; hazardous materials and wastes; and cultural resources.

3.1 Location and General Site Description

CCAFS, an approximately 15,800-acre installation, is located on Canaveral Peninsula, an Atlantic barrier island in Brevard County. The northern boundary of CCAFS abuts the Kennedy Space Center (KSC) boundary on the barrier island. The southern boundary abuts Port Canaveral. The Banana River separates CCAFS from Kennedy Space Center (KSC). The Atlantic Ocean borders CCAFS along its eastern margin.

The proposed borrow site is located on CCAFS directly north of Canaveral Harbor (see **Figure 2**). Littoral drift is predominantly southerly, except for a seasonal reversal in May through September. Since the construction of the entrance channel and jetties in the early 1950s, the beach north of the north jetty has accreted seaward approximately 500-1,000 feet. This accretion is attributed to the interruption of the long-shore transport of sand moving south along the shoreline. The proposed borrow area, which lies within this area that has accreted since the 1950s, generally includes beach and low dunes. The dunes in this area have been invaded by exotic species including Brazilian pepper.

Potential receiving sites lie along the beaches of PAFB, which is approximately 20 miles south of CCAFS. Roads connecting CCAFS and PAFB include State Route 401 and State Route A1A, both of which are four-lane roads.

3.2 Climate and Oceanography

Regional Conditions

Long, relatively humid summers and mild winters characterize the climate at CCAFS and throughout Brevard County. Rainfall is heaviest in summer, with about 65 percent of the annual total falling from June through October in an average year. The other 35 percent is evenly distributed throughout the remaining months. Most rainfall in summer occurs as afternoon and evening showers and thunderstorms. Hail falls occasionally during thunderstorms, but hailstones are usually small and seldom cause damage. Daylong rains in summer are rare, but 2-3 inches may fall within one or two hours. Rainfall in excess of eight inches is rare and is generally associated with tropical storms or hurricanes.

CCAFS is vulnerable to hurricanes and the associated storm tides. The predicted 100-year return period storm water level is +10.5 ft NGVD (Dean and Chui, 1986). Tropical storms may occur from early June through mid-November. The occurrence interval for hurricane force winds (74 mph or greater) in Brevard County is approximately 10 years.

At CCAFS, astronomical ocean tides are semi-diurnal (or twice daily) with mean range of 3.5 feet and a spring range of 4.1 feet. Approximate tidal datums are as follows:

Mean Higher High Water (MHHW)	+2.1 ft
Mean High Water (MHW)	+2.0 ft
National Geodetic Vertical Datum '29 (NGVD)	0.0 ft
Mean Low Water (MLW)	-1.6 ft
Mean Lower Low Water (MLLW)	-1.7 ft
USACE Datum (MLLW)	-1.9 ft

Large-scale oceanographic currents include the northward flowing Gulf Stream, the western edge of which is typically on the order of 50 miles offshore of Cape Canaveral. Nearshore currents are typically southerly directed, driven by local winds and prevailing seas. Canaveral Harbor is physically separated from the interior waters of the Banana River by navigation locks. Tidal currents through the entrance are therefore minor (<0.2 ft/sec).

CCAFS

The inlet at Canaveral Harbor was constructed through the beach in 1950-52, with jetties added in 1952-54. The entrance is maintained to a depth of about -46 ft and authorized width of 400 feet. Its total physical cross-sectional area is about 32,000 square feet. This is about 11.6 times greater than the computed equilibrium area based upon the tidal flows (Olsen 1992); thus, the inlet would rapidly close, or shoal, in the absence of dredging and jetties.

Prevailing seas are from the east-northeast, and the net littoral drift is to the south. Drift along the CCAFS borrow area is almost unidirectionally southward at an estimated rate of about 200,000 to 240,000 cy/yr (USACE, 2003; Kriebel *et al.*, 2002; Olsen, 1992).

Data indicate that accretion patterns changed significantly following inlet construction. North of the inlet, post inlet accretion rates have been measured as 20 to 23 ft/yr on average, or more than 13 ft/yr greater than pre-inlet conditions (Olsen, 1992). South of the inlet, beaches have shown a general reversal in the pre-inlet accretion trends, with net erosion following inlet construction. This erosion is most pronounced in the first 8 to 10 miles south of the inlet and is less significant further to the south. Modeling suggests that the shoreline would have remained accretional for a distance 15 to 20 miles south of the inlet location due to Cape migration (or the natural long-shore movement of sand southward) if the inlet had not disrupted natural shoreline processes. Continuing another 5 to 10 miles south, the shoreline would have been relatively stable with little net change expected due to Cape migration. An independent coastal expert study commissioned by the USACE concluded that the erosional effect of the Canaveral Harbor Federal Navigation Project extends 10 to 15 miles south of the inlet, including the PAFB shoreline (Kriebel *et al.*, 2002).

Kriebel *et al.* (2002) suggests that the average pre-inlet net longshore transport rate at the inlet location was approximately 210,000 cy/yr moving in a southward direction. Since inlet construction, this sand has been partially blocked by the north jetty, deposited on the updrift beaches (i.e., beaches north of the inlet), and partially intercepted by the deep navigation

channel (Kriebel *et al.*, 2002). In the absence of the inlet, this material would have been mostly transported and deposited on beaches south of the inlet. Therefore, this area directly north of the Canaveral Harbor inlet provides naturally occurring, suitable sands that are compatible with beaches further south (i.e., beaches along PAFB that consistently suffer from erosion).

Physical monitoring of the sand bypass borrow area since 1995 indicates that the beach recovers sand at an average rate of 220,000 cy/yr (Bodge & Howard, 2003). Therefore, it has been observed and calculated that proposed borrow area continues to experience a net gain of sand at a rate of 64,000 cy/yr despite the bypass activities.

3.3 Air Quality

The ambient air quality in an area can be characterized in terms of whether it complies with the primary and secondary National Ambient Air Quality Standards (NAAQS). The Clean Air Act , as amended (CAA, 42 U.S.C. s/s 7401 *et seq*.), requires the U.S. Environmental Protection Agency (EPA) to set NAAQS for pollutants considered harmful to public health and the environment. NAAQS are provided for seven principal pollutants, called criteria pollutants (as listed under Section 108 of the CAA), including the following: carbon monoxide (CO); lead (Pb); nitrogen dioxide (NO_2); ozone (O_3); particulate matter with an aerodynamic size less than or equal to 10 micrometers (PM_{10}); particulate matter with an aerodynamic size less than or equal to 2.5 micrometers ($PM_{2.5}$); and sulfur dioxide (SO_2). These pollutants are believed to be detrimental to public health and the environment, and are known to cause property damage.

Air quality is affected by stationary sources (e.g., industrial development) and mobile sources (e.g., motor vehicles). Air quality at a given location is a function of several factors, including the quantity and type of pollutants emitted locally and regionally, and the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersion are wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and topography.

Ozone (O_3). The majority of ground-level (or terrestrial) O_3 is formed as a result of complex photochemical reactions in the atmosphere involving volatile organic compounds (VOC), nitrogen oxides (NO_x), and oxygen. O_3 is a highly reactive gas that damages lung tissue, reduces lung function, and sensitizes the lung to other irritants. Although *stratospheric* O_3 shields the earth from damaging ultraviolet radiation, terrestrial O_3 is a highly damaging air pollutant and is the primary source of smog.

Carbon Monoxide (CO). CO is a colorless, odorless, poisonous gas produced by incomplete burning of carbon in fuel. The health threat from CO is most serious for those who suffer from cardiovascular disease, particularly those with angina and peripheral vascular disease.

Nitrogen Dioxide (NO_2). NO_2 is a highly reactive gas that can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Repeated exposure to high concentrations of NO_2 may cause acute respiratory disease in children. Because NO_2 is an important precursor in the formation of O_3 or smog, control of NO_2 emissions is an important component of overall pollution reduction strategies. The two primary sources of NO_2 in the U.S. are fuel combustion and transportation.

Sulfur Dioxide (SO_2). SO_2 is emitted primarily from stationary source coal and oil combustion, steel mills, refineries, pulp and paper mills, and from non-ferrous smelters. High concentrations of SO_2 may aggravate existing respiratory and cardiovascular disease; asthmatics and those

with emphysema or bronchitis are the most sensitive to SO_2 exposure. SO_2 also contributes to acid rain, which can lead to the acidification of lakes and streams and damage trees.

Particulate Matter (PM_{10} and $PM_{2.5}$). Particulate Matter is typically composed of dust, ash, soot, smoke, or liquid droplets emitted into the air by industrial sources. Fires, construction activities, use of unpaved roads, and natural sources (e.g., volcanic eruptions) also contribute to PM_{10} and $PM_{2.5}$ levels. Small particulates are most likely to cause adverse health effects because they can be inhaled into the lower regions of the respiratory tract where they can aggravate existing respiratory disease and decline in lung function.

Airborne Lead (Pb). Airborne lead can be inhaled directly or ingested indirectly by consuming lead-contaminated food, water, or non-food materials such as dust or soil; fetuses, infants, and children are most sensitive to Pb exposure. Pb has been identified as a factor in high blood pressure and heart disease. Exposure to Pb has declined dramatically in the last 10 years as a result of the reduction of Pb in gasoline and paint, and the elimination of Pb from soldered cans.

CCAFS is a major source of criteria pollutants and, therefore, subject to the Title V permit requirement of the CAA. CCAFS presently operates under an active Title V Permit. At a regional level, air quality within Brevard County and the project area is monitored by the Florida Department of Environmental Protection (FDEP) through its Central Florida District. Three air quality monitoring stations are located within Brevard County, two in Melbourne and one in Cocoa Beach, which monitor for O_3, PM_{10}, and $PM_{2.5}$. Despite the existence of major sources of criteria pollutants within the county, air quality within the project area and the county is considered to be generally good. Brevard County is classified as an attainment area for all Federal Air Quality Standards (FDEP 2004).

3.4 Noise

Noise is generally defined as unwanted sound and can be any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Human responses to noise vary depending on the type and characteristics of the noise, distance between the noise source and receptor, receptor sensitivity, and time of day.

Due to wide variations in sound levels, sound is measured in decibels (dB), which are based on a logarithmic scale (e.g., a 10 dB increase corresponds to a 100-percent increase in perceived sound). Under most conditions, a 3 dB change is necessary for noise increases to be noticeable to humans (USEPA 1973). Sound measurement is further refined by using an A-weighted decibel scale (dBA) that emphasizes the range of sound frequencies that are most audible to the human ear (between 1,000 and 8,000 cycles per second).

The day-night average sound level (L_{dn}) is the energy-averaged sound level measured over a 24-hour period, with a 10-dB penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. The 10-dB penalty is intended to compensate for generally lower background noise levels and increased annoyance associated with noise events occurring during the quieter nighttime hours.

Noise generated on CCAFS from daily operations is comparable to levels experience from typical industrial-type facilities. The noise environment within the project area includes primarily non-impulse noise generated from continuous low-energy noise sources, such as that produced by vehicles, marine vessels, and wave action. The major noise producing sources are breaking

surf, activities on CCAFS, adjacent industrial areas (Port Canaveral), and port traffic entering and leaving Canaveral Harbor.

Industrial activities occur both at CCAFS and at Port Canaveral. In addition, PAFB is an active air base and supports extensive air traffic. Land use along A1A is primarily commercial supporting frequent truck traffic.

3.5 Geology, Topography, and Soils

3.5.1 Geology and Soils

Bedrock at CCAFS ranges from a hard to dense limestone that is a principal part of one of the major Florida Artesian Aquifers, located 75 to 300 feet below the surface. It is overlaid by sandy limestone, calcareous clay with fragments of shells, coquinold limestone and unconsolidated and well-graded quartz sand. The surface is a mixture of permeable sand and shell materials. There are no nearshore (beach) rock outcrops on the installation.

Most soils on CCAFS are moderately well drained to excessively drained, and sandy throughout. The soils are exceptionally dry, even though the water table is often near the surface during rainy periods. The proposed project area is located along the Atlantic beaches north of Port Canaveral. Beach and dune soils are mapped simply as “Coastal Beaches” by the Soil Conservation Service (SCS) and are not assigned a soil series. They are described as a mixture of quartz sand and fragments of seashells. Palm Beach Sand lies inland of Coastal Beaches in the project area. Palm Beach soils are excessively drained. They occur on ridges and have a relatively low water table (45th Space Wing, 2001).

The proposed project area consists of sand deposits directly north of the north jetty of the Port Canaveral Entrance. The majority of this accretion is attributable to impoundment of the beach’s net southerly drift by the inlet’s north jetty (Bodge, 1994). The inlet’s impoundment effect likely extends northward from the jetty approximately 11,000-17,500 feet. In the absence of the Port Canaveral Entrance, this accreted material would have been transported naturally to the shorelines south of the entrance (Olsen, 1997).

Along and near the shoreline, soils above about -20 ft NGVD elevation are fine to medium sand (SP and SP-SM), with grain size generally increasing with higher elevations. Below -20 ft NGVD, sediments become increasingly dominated by silt and clay (SM, SC). Olsen (1997) noted that sediments above about –11 ft NGVD elevation would be compatible with PAFB beaches; however, optimal material is found above –5 to –7 ft NGVD elevations. The proposed borrow area sediments are above +2 ft NGVD.

In December 2003, 16 test holes were dug within the proposed project area to evaluate particle size distribution and general compatibility with beach sands and requirements for beach fill at PAFB. Data and analysis pertaining to this investigation are included in **Appendix 1**.

The median grain size of the material sampled from within the proposed borrow area limits (**Figure 3**) is 0.41 mm with less than 0.4% fines (<0.074 mm) on composite average. Maximum population of fine sediments in any of the samples was less than 1%. The material is very similar to the native and existing beach sands along the PAFB beach berm; viz., 0.34 and 0.39 mm, respectively. (Here, *native* refers to the beach sand along PAFB prior to the placement of the 2000/01 fill project; and, *existing* refers to the beach sand that presently characterizes

PAFB, after placement of the 2000/01 fill material from the Canaveral Shoals II offshore borrow area.) The borrow material is coarser than the average grain size of the overall PAFB profile.

The carbonate content in the samples ranged from 37% to 68%, and 51.6% on average. This is similar to the existing beach material at 41%.

The samples across the borrow site exhibited a wide and random variation in the grain size, with no apparent alongshore or vertical trends. Overall, the material is physically compatible with the native and existing beach sands along PAFB. This is not surprising given that the proposed borrow area is the beach (i.e., the borrow material is to be taken directly from the *native* beach immediately north of the inlet). In the absence of the inlet, much of this sand would have normally been transported southward to and beyond the PAFB beach.

The borrow sand is very similar in grain size distribution and carbonate (or shell) fraction to the existing beach fill sand along PAFB, as placed in 2000/01. This fill sand has demonstrated excellent performance for marine turtle nesting success to date. It is therefore reasonably anticipated that the proposed borrow area material will be well suited for marine turtle nesting.

3.5.2 Topography and Beach Profile

Natural elevations on CCAFS are generally less than 12 feet above MLW, or approximately 10 ft above NGVD, except for dune areas which are slightly higher. Since the construction of the entrance channel and jetties associated with Canaveral Harbor, the beach north of the north jetty has accreted seaward approximately 500-1000 feet. **Figure 3** shows the historical shoreline (1951) in the general project area. The proposed borrow area is landward of the mean high water line and generally includes beach and low dunes ranging in elevation from approximately +2 to +12 feet.

The current shoreline in the proposed project area is dynamic and is influenced by several natural and artificial drivers, including:

- Wave action, tides, and storm surges;
- Port Canaveral Entrance Channel and jetty; and
- Dredging associated with the Canaveral Harbor Sand Bypass System.

The proposed project area was most recently surveyed in May 2006. A typical profile is presented in **Figure 4**. Generally, the beach and dune system in this area range in elevation from approximately 0 – 12 feet. The intertidal zone is approximately 200 feet wide and the primary and secondary dunes in this area are relatively low.

3.6 Water Resources

3.6.1 Groundwater Resources

Groundwater elevation in the proposed project area generally ranges from approximately 1 - 3 feet above mean sea level (msl), but fluctuates as a result of hydrologic events and tides. Due to the close proximity to the ocean, groundwater in the project area is likely brackish.

3.6.2 Surface Water Resources

The Atlantic Ocean lies directly east of the proposed project area. The waters adjacent to the project areas are classified by the State of Florida as Class III, which is suitable for recreation and the propagation and management of fish and wildlife.

Canaveral Harbor lies directly south of the proposed project area.

3.6.3 Floodplains

Floodplains are lowland, relatively flat areas, adjoining inland and coastal waters that are subject to flooding. On CCAFS, the 100-year floodplain extends to 7 feet above msl on the ocean side and 4 feet above msl on the Banana River side. The 500-year floodplain elevations are 10 feet above msl on the ocean side of CCAFS and 6 feet above msl along the Banana River. The majority of the proposed project area lies within the 100-year floodplain.

Executive Order 11988 requires all Federal agencies to provide leadership and take action to reduce the risk of flood loss; to minimize the impacts of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains in acquiring, managing and disposing of Federal lands; providing Federally undertaken, financed, or assisted construction and improvements; and conducting Federal activities and programs affecting land use. Air Force installations have the responsibility to determine if proposed actions will occur in a floodplain, evaluate and document the potential effects; and consider alternatives to avoid these effects and incompatible development in the floodplain (45th Space Wing, 2001).

3.7 Biological Resources

3.7.1 Habitat and Vegetation Communities

The proposed borrow area encompasses beach dune and coastal grassland areas along approximately 3600 feet of shoreline north of the Canaveral Harbor entrance. Common species of beach dune communities include sea oats (*Uniola paniculata*), bitter panicum (*Panicum amarum*), railroad vine (*Ipomoea pes-caprae*), and beach elder (*Iva imbricata*) with other species occurring in lesser quantities. Coastal grassland areas are located inland from the coastal dunes and are dominated by a variety of grasses (i.e., *Andropogon longiberbis*, *Muhlenbergia capillaris*, *Panicum amarum*, *Schizachyrium littorale*, *Spartina patens*, and *Uniola paniculata*) and forbs (camphorweed [*Heterotheca subaxillaris*] and partridge pea [*Cassia fasciculata*]). Species common to coastal dunes also inhabit grassland areas (Dynamac Corporation, 1996). Much of the project area is dominated by invasive species such as Brazilian pepper (*Schinus terebinthifolius*) and castor bean (*Ricinus communis*).

3.7.2 Wetlands

The proposed project site is generally comprised of well drained sandy soils. No wetlands occur within the project area. However, a very small wetland area occurs in an overwash area near the southeastern corner of the project area. The Air Force would create a buffer zone of no less than 100 feet between the wetland boundary and the construction zone of influence.

3.7.3 Fauna Including Migratory Birds

Numerous faunal species occur throughout the CCAFS property. Common species that would be expected to occur within the proposed project area include: white-tailed deer (*Odocoileus virginianus*), armadillo (*Dasypus novemcinctus*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), bobcat (*Felis rufus*), spotted skunk (*Spilogale putorius*), cotton rat (*Sigmodon hispidus*), cotton mouse (*Peromyscus gossypinus*), southeastern beach mouse (*Peromyscus polionotus niveiventris*), gopher tortoise (*Gopherus polyphemus*), and ghost crab (*Ocypode quadrata*). CCAFS is also home to numerous birds including those protected at the Federal level by the Migratory Bird Treaty Act (MBTA). Executive Order 13186, signed in 2001, requires Federal agencies to protect migratory birds and their habitats. Although numerous migratory birds occur at the CCAFS, only a handful would be likely to occur within the proposed project area. These primarily include shore birds. Abundance of nesting shorebirds varies from year to year, but minimal nesting activity has occurred on the south end of Cape Canaveral in several years. Wilson's plover (*Charadrius wilsonia*) nested in the area in 2004 (personal communication, Don George, 2004).

3.7.4 Threatened and Endangered Species

Approximately 60 federally and/or state listed species are known to occur in Brevard County (Florida Natural Areas Inventory [FNAI], 2004). However, only six listed species are likely to occur within the proposed project area: Southeastern beach mouse; loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), eastern indigo snake (*Drymarchon corais couperi*) and gopher tortoise. Based on available habitat, threatened and endangered species that may occur within the project area are listed in **Table 3-1**. Additional species (i.e., wood stork [*Mycteria americana*]) could occur in the vicinity, but likely would not inhabit or use the specific project area; such species are not included in **Table 3-1**. It should be noted that only the southeastern beach mouse, loggerhead, green and leatherback sea turtle, and gopher tortoise have been documented within the project area. Although not documented, it is likely that the eastern indigo is found within the project area, as well. As the proposed project area is located above mean high water, no marine mammals occur in this area. Two small patches of sea lavender (*Argusia gnaphalodes)* have been observed within the project area.

Table 3-1 Federally and State Listed Species that May Occur within General Project Area

Common Name	Scientific Name	Federal/State Status	Occurs Within Project Area?
Mammals			
Southeastern beach mouse	*Peromyscus polionotus nineiventris*	LT/LT	**Yes**
Birds			
Piping plover	*Charadrius melodues*	LT/LT	No
Peregrine falcon	*Falco peregrinus*	N/LE	No
American oystercatcher	*Haematopus palliatus*	N/LS	Possible
Osprey	*Pandion haliaetus*	N/LS	Possible
Brown pelican	*Pelecanus occidentalis*	N/LS	Possible
Black skimmer	*Rynchops niger*	N/LS	Possible
Least tern	*Sterna antillarum*	N/LT	Possible
Reptiles			

Common Name	Scientific Name	Federal/State Status	Occurs Within Project Area?
Eastern indigo snake	*Dymarchon corais couperi*	LT/N	**Probable**
Green sea turtle	*Chelonia mydas*	LE/LE	**Yes**
Leatherback sea turtle	*Dermochelys coriacea*	LE/LE	**Yes**
Loggerhead sea turtle	*Caretta caretta*	LT/LT	**Yes**
Gopher tortoise	*Gopherus polyphemus*	N/LS	**Yes**
Plants			
Sea lavender	*Argusia gnaphalodes*	N/LE	**Yes**
Sand-dune spurge	*Chamaesyce cumulicola*	N/LE	Possible
Coastal vervain	*Glandularia maritima*	N/LE	Possible
Atlantic Coast Florida lantana	*Lantana depressa var. floridana*	N/LE	Possible
Coastal hoary-pea	*Tephrosia angustissima var. curtissii*	N/LE	Possible

LE – Listed as Endangered
LT – Listed as Threatened
LS – Listed as Species of Special Concern
N – Not Listed

3.7.5 Federally Listed Species Potentially Occurring in Project Area

Southeastern beach mouse - Historically, the southeastern beach mouse ranged from Ponce Inlet in Volusia County, Florida, south to Hollywood Beach in Broward County, Florida. It is currently restricted to Volusia, Brevard, and St. Lucie Counties (USFWS, 2002). Populations of this species exist on Cape Canaveral National Seashore, Merritt Island National Wildlife Refuge, KSC, CCAFS and the southern half of Sebastian Inlet State Recreation Area (Stout, 1992; USFWS, 1992). The beach mouse inhabits primarily sand dune areas vegetated by sea oats and dune panic grass. The mouse can also be found in sandy areas with scattered scrub found behind primary dunes. The decline of beach mouse populations can be attributed to loss of suitable habitat by development and erosion along the beach and from predation. Competition from other mouse species can also be a threat.

Oddy (2000) performed a Southeastern beach mouse survey on CCAFS in the general project area from 1995 through 1997. Based on a survey grid that was located within the proposed project area, beach mouse densities varied from a mean low of 10 per hectare to a mean high of 37 per hectare, with an average of 19 per hectare. Stout (2005) performed a study to estimate the abundance of the southeastern beach mouse in the coastal dune area immediately north of the jetty at Port Canaveral in August 2005. The study demonstrated a minimum of six individuals present within the 1.44-hectare trapping grid. This suggests an approximate density of 4.1 individuals per hectare. However, “an estimate of 4.1 [southeastern beach mice] per hectare may be misleading because no captures of this species were made in the southern one-third of the grid” (Stout, 2005).

No critical habitat for the beach mouse has been designated.

Loggerhead Sea Turtle - Within the U.S., the loggerhead sea turtle nests primarily on beaches from North Carolina to Florida. The loggerhead nesting season encompasses late April – September with most nesting occurring in June and July. Incubation period is temperature dependent and most nests hatch within 60 days, although up to 70 days may be required for some nests in the northern periphery of the nesting range. Nesting densities vary from less

than one nest per kilometer on the average for some beaches in the northeast, southeast, and the panhandle of Florida to over 600 nests per kilometer on some stretches of beach in south Brevard County (Ehrhart & Witherington, 1986).

CCAFS is surveyed each year for sea turtle nests. The beach at CCAFS is divided into 21 one-kilometer sections. Numbering starts at the north jetty of the Canaveral Harbor inlet and continues northward. The proposed project area is located within kilometer 1. The 2006 turtle nesting season recorded a total of 3,652 loggerhead turtle crawls, of which 1,825 resulted in egg deposition. Loggerhead turtle nests comprised 97% of total nesting activity on CCAFS in 2006. Historically, kilometer 1 of the CCAFS has the smallest density of turtle nests for the installation. In 2006, 10 turtle nests were recorded for kilometer 1; this was the lowest density for the entire 21 kilometers of CCAFS beaches. The highest densities of sea turtle nests occur in kilometers 10 – 16, with nesting densities reaching over 200 nests per kilometer. **Figure 5** presents the 2006 spatial distribution of loggerhead turtle crawls at CCAFS.

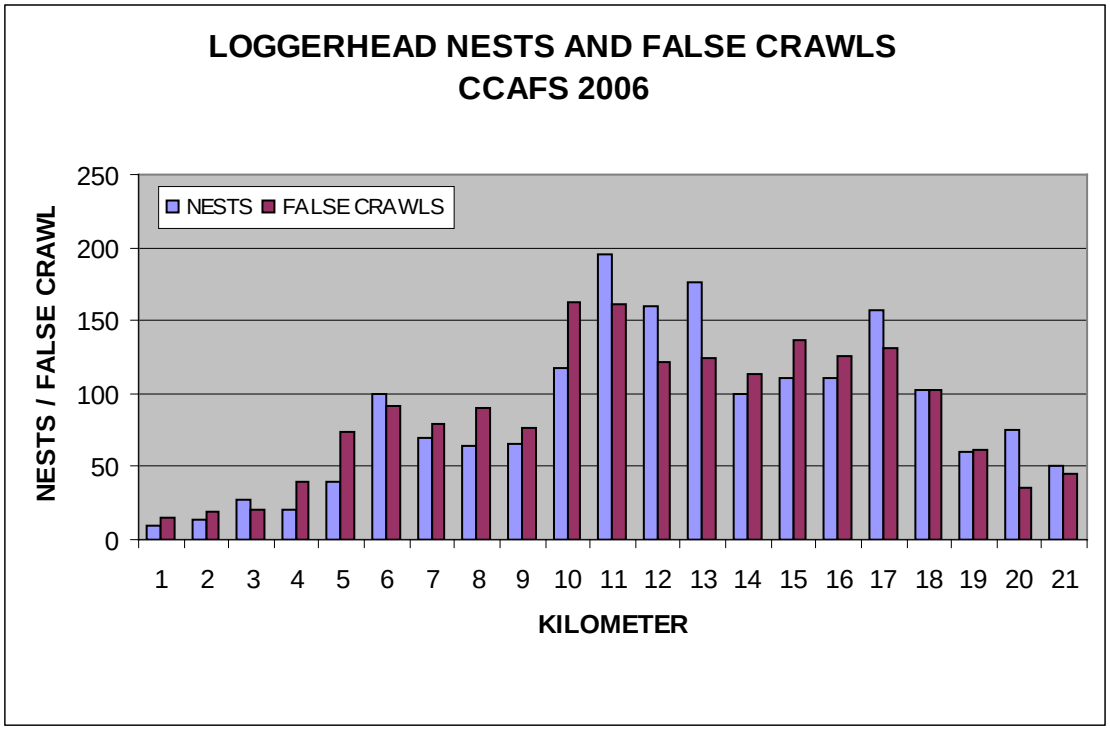

Figure 5: Distribution of Loggerhead Turtle Crawls, CCAFS, 2006

Green Sea Turtle - Green turtle nesting within the U.S. occurs principally along the southeast Florida coast from Volusia through Broward Counties (Meylan *et al.* 1995). Nesting densities are much lower than for the loggerhead and range from 1-5 nests/km on most beaches within its major nesting range to 13-30 nests/km on high density green turtle nesting beaches in south Brevard County and south Jupiter Island in Palm Beach County (Ehrhart & Witherington, 1986; Meylan *et al*., 1995). Brevard County accounts for 39.5% of the green turtle nesting in the state with the majority of the nesting occurring on the South Brevard Beaches (Meylan *et al.*, 1995). Nesting occurs May – September with the peak nesting occurring in July – August. Hatching period is similar to the loggerhead.

Green turtle breeding populations in Florida and along the Pacific Coast of Mexico are listed as federally endangered; all others are listed as threatened. The number of green sea turtle nests at CCAFS varies significantly each year. The 2005 nesting season was a record year for green turtle nesting activity with over 150 nests recorded at CCAFS. A total of 113 green turtle crawls were observed in 2006 at CCAFS, with 53 resulting in egg deposition. No nests were deposited in the proposed project area but green nests have been documented in this area during other years.

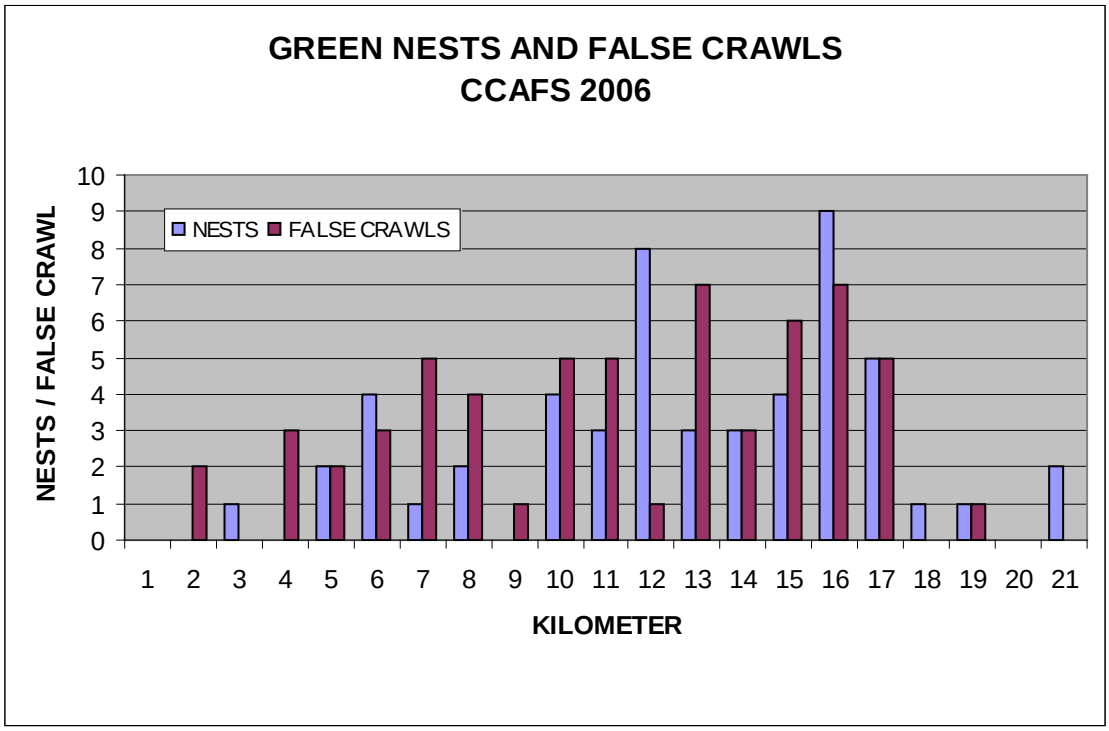

Figure 6: Distribution of Green Sea Turtle Crawls, CCAFS, 2006

Leatherback Sea Turtle - Leatherback nests can be found along the shores of the Atlantic, Pacific and Indian Oceans. Nesting within the U.S. (and its territories) occurs primarily in Puerto Rico and the Virgin Islands. Nesting begins as early as late February and terminates by late July. Much of the nesting occurs in St. Lucie, Martin, and Palm Beach Counties but scattered nesting has been recorded on almost all Florida east coast county beaches (Meylan *et al.* 1995).

Nesting on CCAFS was first documented in 1986 when a single leatherback nest was recorded by CCAFS biologists. No nests were identified on CCAFS in 2006; however, 35 nests have been documented since surveys began. In 2004, a leatherback nest was deposited in kilometer 2; therefore, it is possible that leatherbacks would utilize the beaches within the project area.

Eastern Indigo Snake - At one time, the eastern indigo's range included all of the Florida peninsula, north to Georgia, South Carolina, Alabama, and Mississippi. The eastern indigo snake may be found in a variety of habitats including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields,

coastal dunes, and human-related habitats. Wherever this species occurs in xeric habitats, it is often closely associated with the gopher tortoise, whose burrows provide shelter from winter cold and desiccation. In the milder climates of south and central Florida, eastern indigo snakes exist in a more stable thermal environment and likely depend less on thermal refugia (USFWS, no date).

The indigo snake has been identified throughout CCAFS from road kills, observations and field collections. Although the eastern indigo snake is often associated with gopher tortoise burrows, field inspection of burrows at CCAFS has not found a close association between these two species. No indigo snakes have been discovered in gopher tortoise burrows that have been excavated at CCAFS (Angy Chambers, pers. comm., 2007).

3.7.6 State Listed Species Potentially Occurring in Project Area

American oystercatcher - The American oystercatcher is a large shorebird of the Atlantic and Gulf Coasts of North America. This species is found only along the coast, in areas with large sandy or shell beaches, tidal mudflats, rocky coast, and salt marsh. Breeding in the U.S. occurs along the Atlantic coast from Massachusetts south to Georgia, and in selected localities along the Gulf Coast in Florida, Alabama, Louisiana, and Texas. Breeding populations do not occur in Brevard County. The species feeds on oysters, clams, and mussels, but it does not probe for marine worms and other food items in the intertidal zone (Audubon website: http://www.audubon.org/). Although never observed in the project area, oystercatchers have been observed on the CCAFS beach in other areas.

Osprey - The osprey is a large fish-eating hawk that occurs throughout the world. Ospreys are most often found near water, usually nesting near the top of large trees. At CCAFS, they have historically nested on boresight towers, utility poles, antennas, and gantries. CCAFS supports a large population of ospreys. There are currently no active osprey nests within the proposed area of excavation; however, there are nests adjacent to this area and osprey regularly feed in the waters just offshore from the project area.

Brown pelican - The brown pelican is a large water bird. It is found along the coast in California and from North Carolina to Texas, Mexico, the West Indies and many Caribbean Islands, and to Guyana and Venezuela in South America. Brown pelicans would be expected to occur in the general vicinity of the project area. Sand spits and offshore sand bars are used extensively as daily loafing and nocturnal roost areas. The preferred nesting sites are small coastal islands which provide protection from mammal predators, especially raccoons, and sufficient elevation to prevent widescale flooding of nests.

Brown pelicans nest in colonies mostly on small coastal islands. The nests are usually built in mangrove trees or other vegetation of similar size, but ground nesting may also occur. Ground nests vary from practically nothing to well built nests of sticks, reeds, straws, palmetto leaves, and grasses. The eastern subspecies nests mostly in early spring or summer, although fall and winter nesting have been recorded in some localities. Brown pelicans have been observed loafing in the project area, as well as feeding just offshore.

Black skimmer - The black skimmer is a shorebird that occurs along shorelines and estuaries throughout Florida. Black skimmers traditionally nested in colonies on bare sandflats just above the high-water mark. Black skimmers also nest inland and on rooftops in Florida, which may reflect a shortage of suitable coastal breeding habitat. Nesting occurs in May through August in Florida. No nesting colonies occur within the proposed project area (Florida's Breeding Bird

Atlas, no date); however, this species has been documented nesting just to the north in km 2 and feeds just offshore from the project area.

Least tern - The least tern is the smallest American tern, weighing about 1 ounce and measuring about 9 inches in length. In Florida, least terns have traditionally nested on the sandy beaches of barrier islands and along isolated stretches of the mainland shore. However, least terns also nest on roofs and on islands and causeways constructed of dredged material. Least terns nest along sandy beaches on the southern portion of CCAFS and on gravel rooftops in the industrial area of CCAFS. They are very sensitive to disturbance when nesting and can be very aggressive if their nest is approached. Least terns typically nest on CCAFS between April and August (45th Space Wing, 2001). Least terns are not known to nest in the proposed project area but have been observed nesting just north of this area and are know to feed in the waters just offshore from the project area.

Gopher tortoise - The gopher tortoise is a land tortoise that occurs in upland habitats throughout the coastal plain of the southeastern United States, with most being found in north-central Florida and southern Georgia. It is illegal to take, harm, or harass this species. Likewise, the destruction of gopher tortoise burrows constitutes a take[1] under the law except as authorized by specific permit. Although the gopher tortoise is not federally protected in Florida, it is afforded protection by the Air Force due to its state ranking and the commensal use of its burrow by other federally protected species. Gopher tortoises live in burrows that average 15 feet long and 6 feet deep. The burrows provide protection from predators, fire, and the weather. The burrow is also an important habitat for other native species. Some commensals observed utilizing burrows on CCAFS include the eastern diamondback rattlesnake, eastern coachwhip, ghost crabs, box turtle, cotton mouse, and armadillo (45th Space Wing, 2001).

Gopher tortoises inhabit upland habitats common in central Florida, including scrub, pine flatwoods, and the dune area along beaches. Their diet consists mainly of grasses, grass-like plants, and legumes. The current population of gopher tortoises on CCAFS is not known; although, based on station biologists' observations, a considerable number of individuals inhabit the station. Gopher tortoises are present and common in the general project area, primarily inland from the proposed cut area. Gopher tortoises are not expected to be abundant in the proposed area of excavation; however, gopher tortoises are likely to occur in the general vicinity where access roads may be required.

Listed Plants - **Table 3-1** includes listed species that are known to occur in Brevard County and are generally found in dune or coastal habitats. In 1998, the Florida Natural Areas Inventory (FNAI) completed a biological survey of CCAFS. No federally-listed plant species were identified at CCAFS during this survey (FNAI 1998); therefore no Federally-listed plants would be expected to occur within the project area. Recent site visits have confirmed this.

[1] "Take" is defined in the ESA as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered species. Harm may include significant habitat modification where it actually kills or injures a listed species through impairment of essential behavior (e.g., nesting or reproduction).

3.8 Socioeconomics and Land Use

3.8.1 Land Use and Public Access

Cape Canaveral AFS encompasses over 15,800 acres that support the space launch and test requirements of the Department of Defense (DoD), 45th Space Wing, National Aeronautics and Space Administration (NASA), Naval Ordnance Test Unit (NOTU), Space Florida, and numerous commercial contractors. The mission of CCAFS is to implement the mission and vision of the 45th Space Wing which are: "Enhance national strength through assured access to space for Department of Defense, civil, and commercial users" and "To be the world's premier gateway to space," respectively.

Cape Canaveral AFS has the largest number of launch pads in the world with 16 launch pads in 11 Space Launch Complexes (SLCs). Cape Canaveral AFS maintains a specialized Industrial Area to support the technical/mechanical and administrative needs of launch programs. This area houses warehouse and hangar space used to store critical spares and package payloads and serves as a base of operations for Civil Engineering, Base Operations, and Command personnel. Security and fire protection personnel are also located in the Industrial Area.

Outside the launch and industrial areas, the scope of CCAFS is varied. Fuel storage areas and scrub-jay habitats exist side-by-side with satellite processing facilities, recreational canoe launches, and lunch pavilions. Range tracking for the Eastern Range begins at CCAFS with the Range Operations Control Center and is picked up by other 45 SW installations such as PAFB, Ascension Island, and Antigua Island. Command Destruct and other safety measures are tested and implemented here for base personnel and civilian safety. Cape Canaveral AFS also has a deep-water port that is used predominately by the Navy and foreign military ships. Ships carrying payloads and bound for space programs also offload at CCAFS wharfs. This port is located at the Air Force portion of Port Canaveral.

Land use at CCAFS is planned and managed by requirements to support highly hazardous, large-scale missile test and launch activities. Existing land use is divided into five major zones: 1) Missile and Launch Support, 2) Restricted Development, 3) Port Operations, 4) Industrial Area, and 5) Airfield Operations. According to the CCAFS Master Plan, dated 2002, the proposed project area is designated as Port Operations, which occupies 184 acres on the north side of Port Canaveral. The port is an artificial harbor that supports both commercial and industrial activities.

The proposed borrow area lies entirely within the CCAFS, within the area designated for Port Operations. No public access is permitted and no recreational facilities are located within or adjacent to the proposed project area. No port-related activities occur within the specific project area.

3.8.2 Aesthetic Resources

The beach and dune system in the vicinity of the proposed borrow area is undeveloped and generally provides an aesthetically pleasing environment. However, due to the invasion of Brazilian pepper and other invasive species, a large portion of the proposed borrow site is not considered a pristine beach and dune system.

3.8.3 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, is designed to focus federal attention on the environmental and human health conditions in minority communities and low-income communities with the goal of achieving environmental justice. Executive Order 12898 is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment.

The concept of environmental justice is based on the premise that no segment of the population should bear a disproportionate share of adverse human health or environmental effects of a proposed Federal action. Historically, low-income communities and minority communities have, in some cases, been disproportionately affected by negative environmental effects, receiving few of the benefits of economic growth and development, while absorbing much of the societal cost. The proposed borrow area is located on the CCAFS, where no housing exists and where no congregation of low-income or minority communities exist.

3.8.4 Protection of Children

Because children may suffer disproportionately from environmental health risks and safety risks, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, was introduced on April 21, 1997. Executive Order 13045 was intended to prioritize the identification and assessment of environmental health risks and safety risks that may affect children and to ensure that Federal agencies' policies, programs, activities, and standards address environmental risks and safety risks to children.

There are currently no family housing units at CCAFS, and no children reside at the installation. There are no day care centers on base. As indicated in Section 3.8.1, *Land Use and Public Access*, no access is permitted to the proposed borrow site. Therefore, there are no facilities designated for the specific use by occupation of children on or near the project site.

3.9 Traffic and Transportation

The proposed project would require transport of material from CCAFS to PAFB. State Road A1A connects these two installations. This is the only route that would be feasible for the transport of sand from CCAFS to PAFB beaches. State Road A1A is the primary road that runs north-south on the Canaveral Peninsula. This four-lane road accommodates considerable traffic. Based on the Florida Department of Transportation's (FDOT) 2003 Annual Average Daily Traffic (AADT)[2] Report, average daily two–way traffic on State Road A1A (along the proposed transportation route) varied from approximately 10,000 to 40,000 vehicles (FDOT 2003).

3.10 Hazardous Materials and Waste

Hazardous wastes are defined as any solid, liquid, contained gaseous or semi-solid waste, or any combination of wastes, which pose either a substantial present or potential hazard to

[2] Annual Average Daily Traffic (AADT) is the total volume of traffic on a highway segment for one year, divided by the number of days in the year.

human health or the environment, as determined by ignitable, corrosive, reactive, or toxic characteristics.

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Superfund Amendments and Reauthorization Act (SARA), and the Resource Conservation and Recovery Act (RCRA) are the primary regulations that govern hazardous material and waste use, handling, and remediation on Federal properties. No hazardous wastes are currently generated, stored, handled, transported, treated, or disposed within the project area.

3.11 Cultural Resources

Baer (1996) conducted a magnetometer survey of the proposed project area to locate potential cultural resources in 1995. Since the proposed project is located within recently accreted sands, likely cultural resources could include those associated with a shipwreck. Ferromagnetic materials such as iron cannon, metal ships fittings, anchors, some ballast, pottery, and kiln fired clay items may be detected using a magnetometer. During the course of the investigation, some modern vessel debris was discovered, but nothing was determined to be culturally significant. Baer (1996) concludes that there are no significant historic or cultural materials within the area in which the proposed borrow area is sited (Baer, 1996).

4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND NO ACTION ALTERNATIVES

4.1 General Overview

Both the Proposed Action and No Action Alternative are analyzed in this section.

The proposed action would designate the artificially accreted area north of Canaveral Harbor as a borrow source for beach compatible sand. This material would be used by the 45th Space Wing to repair PAFB beaches eroded by ocean/storm damage. Existing vegetation would be removed and overlying sands would be excavated and truck hauled to beaches at PAFB. All excavation activities would occur above the mean high water line. Short-term impacts associated with excavation activities include removal of vegetation and potential injury or death to fauna within the project area, including the federally listed southeastern beach mouse. Long-term impacts include the loss of beach dune habitat, which is currently utilized by the southeastern beach mouse.

The No Action Alternative would have no impacts to the existing environment. The Canaveral Harbor inlet and jetties would continue to cause sand to unnaturally accrete north of the jetty.

4.2 Climate and Oceanography

Large storm events and storm surges have the capacity to greatly affect the beaches at CCAFS, including the beaches in the proposed project area. **Section 4.5.1.2** discusses potential affects of storm events on the beaches following implementation of the proposed project.

4.3 Air Quality

4.3.1 Proposed Action

Impacts of the proposed project to air quality would be expected to be minor, but could include vehicle emissions from additional vehicles within the project area and wind-blown sand and fugitive dust associated with loading, unloading, and transporting sand from the proposed borrow area to receiving sites on PAFB beaches. Ocean breezes would be expected to disperse vehicle and heavy equipment exhaust from the project area. To minimize impacts to less than significant levels, contractors would be required to take measures to prevent fugitive dust and loss of sand from vehicle loads. Required measures would include:

- Watering down dirt haul roads for dust control; and
- Covering loaded truck beds with secured geotextile fabric before transporting.

4.3.2 No Action

As no actions are proposed under the No Action Alternative, there would be no impact to local air quality.

4.4 Noise

4.4.1 Proposed Action

Under the proposed action, activity at the project site would include sand-moving equipment and action associated with sand removal that would occur at the site only temporarily. Short-term, temporary noise levels in the project area would increase as a result of these proposed excavation and transport activities. Additional noise sources would include heavy equipment (i.e., bulldozers, scrapers, loaders, equipment excavators, etc) and trucks used to haul excavated sand. This additional noise is compatible with existing land use in the general project area and therefore, does not constitute a significant impact. Following implementation of the proposed action, noise sources would remain at their present noise levels.

4.4.2 No Action

Under the No Action Alternative, there would be no heavy equipment operating in the project area. In addition, there would be no dump trucks operating along State Route A1A as a result of project implementation. As no actions are proposed under the No Action Alternative, no impacts are anticipated.

4.5 Geology, Topography, and Soils

4.5.1 Proposed Action

4.5.1.1 Geology and Soils

As discussed in Section 2, implementation of the proposed project would call for the removal of approximately 20,000 to 130,000 cubic yards of sand, depending on the need. Prior to excavation, surface sands (top 6-12 inches) would be moved to form a dune structure landward of the proposed excavation. The proposed project would only impact sands in the immediate vicinity of the excavated area. Since all of the sand in the project area is accreted beach sand, the proposed action would not adversely affect the native soils or geology of CCAFS.

4.5.1.2 Topography and Beach Profiles

Implementation of the proposed project would change the existing beach within the project area (approximately 3600 feet of beach directly north of Port Canaveral Channel). Olsen (2004) completed modeling of the shoreline and beaches to predict future beach profiles in the project area as a result of implementing the proposed project. The numerical model SBEACH was used to simulate the storm-induced equilibration of the beach profiles following implementation of the proposed action. The model was run for both the excavation of the beach (Proposed Action) and the simultaneous excavation of the beach and the excavation of nearshore material (Sand Bypass Project). The model results suggest that a typically severe (10 to 20-year) storm event is not expected to result in erosion of the CCAFS uplands under either excavation scenario. Further, the model results do not suggest any impacts to the beach landward of the project area; i.e., outside the area to be excavated or landward of the proposed dune element. Larger, more severe storms are anticipated to flood the backshore portion of the project area, with or without the proposed activity (Olsen, 2004).

Figure 7 depicts the predicted equilibration of the beach profile in response to a 10- to 20-year storm event for (1) typical existing conditions, (2) the USACE's sand bypass borrow activity by

itself, (3) the proposed CCAFS upland borrow activity by itself, and (4) the combined effect of the USACE's sand bypass borrow and proposed CCAFS upland borrow activity. As indicated in the figure, the equilibration effect (profile response) is limited to the project borrow area. The small dune to be constructed along the landward edge of the borrow area is not predicted to be undercut or significantly overwashed by the equilibrium storm event. Profile accretion (recovery) associated with southerly directed transport moving into the borrow area is not included in the model and is therefore not shown. Detailed descriptions of analysis scenarios and model results are included in **Appendix 2**.

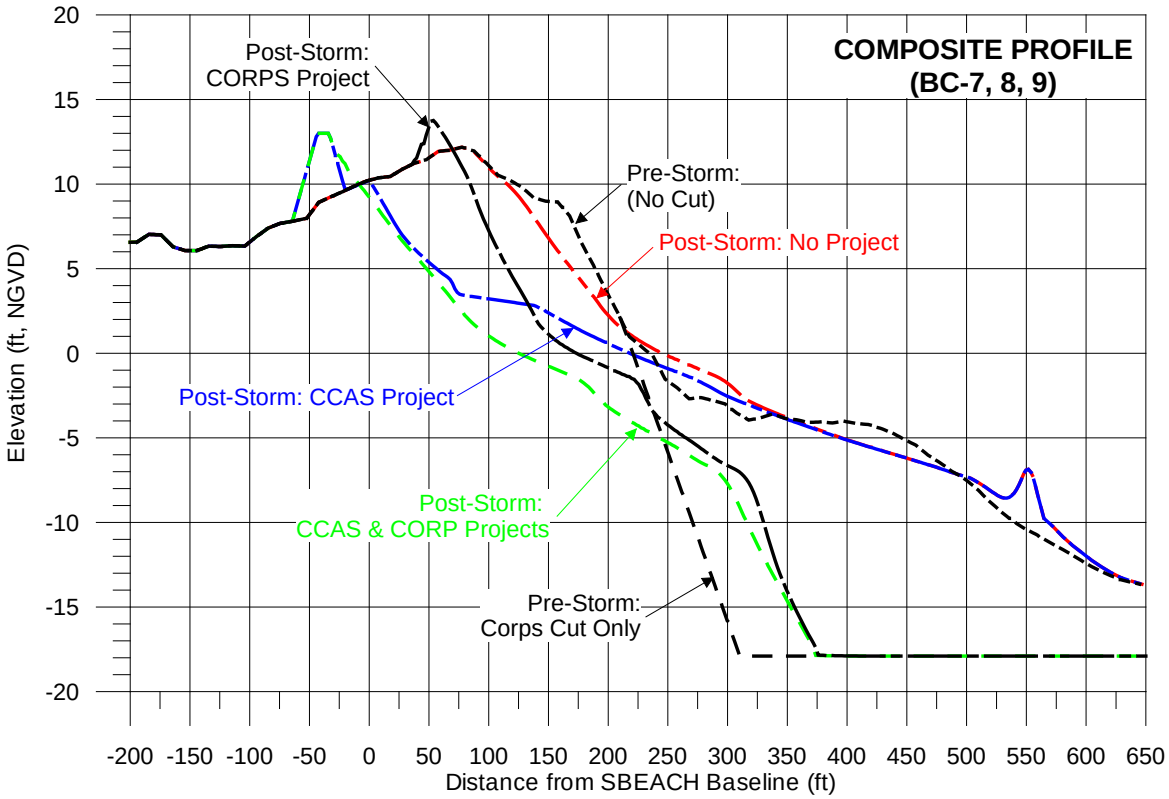

Figure 7: Predicted Beach Profile Equilibrium in response to (1) no borrow activity – red line, (2) Corps' sand bypass borrow activity – black line, (3) proposed CCAFS upland borrow activity – blue line, and (4) combined Corps' and proposed CCAFS upland borrow activities – green line.

4.5.2 No Action

The beaches at the proposed borrow site would be expected to continue to accrete as they have for the last 50 years, while beaches south of the inlet would continue to erode. Sand would continue to accumulate updrift of the Canaveral Harbor north jetty in response to the jetty sand-tightening and extension (USACE, 2003) and in excess of that which is bypassed by the Corps' sand bypass project. Continued accretion significantly alters site topography and beach profile.

4.6 Water Resources

4.6.1 Proposed Action

4.6.1.1 Groundwater Resources

Because groundwater within the proposed project area is relatively close to the surface, and sands are relatively permeable, it is conceivable that a fuel spill or leak could potentially impact groundwater. However, all refueling will occur in the equipment staging area within 50 feet of an emergency spill clean-up kit. No refueling will occur on the beach.

4.6.1.2 Surface Water Resources

As no water-born equipment would be used during the proposed project, surface water impacts are not anticipated. Excavation will be by mechanical operations above the mean high water line. The soils are naturally deposited beach sands, with less than 1% fine-grained sediments. Adverse impacts to water quality, if any, are therefore reasonably anticipated to be not significant.

4.6.1.3 Floodplains

Proposed project activities would occur within the designated 100-year floodplain. However, impacts to adjacent uplands would not occur as a result of impacting the floodplain. As indicated in **Figure 6**, the equilibration effect (profile response) is limited to the project borrow area. The small dune to be constructed along the landward edge of the borrow area is not predicted to be undercut or significantly overwashed by the equilibrium storm event.

4.6.2 No Action

As no actions are proposed under the No Action Alternative, no impacts are anticipated.

4.7 Biological Resources

4.7.1 Proposed Action

4.7.1.1 Habitat and Vegetation Communities

Current habitat and vegetation communities would be impacted in areas where excavation occurred or access roads created. Depending on the need for beach fill material, anywhere from approximately 1.3 to 21 acres may be impacted during an excavation event. Excluding staging/fueling areas, the maximum amount of habitat that would be impacted by the implementation of the proposed project would be approximately 24 acres, including construction of the dune feature. It is estimated that staging/fueling areas would impact approximately one acre. All vegetation would be removed from potential borrow areas with the implementation of the project. Once vegetation is removed, the topsoil (approximately 6-12 inches) would be grubbed and pushed to the inland edge of the project area to create a dune structure (see **Figure 4**). This dune structure would be planted with native vegetation such as sea oats and sea grape. Areas which are excavated would be graded, but would not be planted. These areas are expected remain dynamic as a result of wind and storm surges that will continue to shape the beach. Once the beach has equilibrated, the shoreline (high water line) may retreat approximately 100 feet from the pre-excavation location. As illustrated in **Figure 6**, however,

the predicted profile adjustment (equilibration) extends only to the seaward face of the dune feature. As a result, a relatively small amount of upland habitat would be lost as a result of the proposed project.

4.7.1.2 Wetlands

No impacts to wetlands are anticipated. If operations are planned near the wetland located near the southwest corner of the project area, erosion and sedimentation control measures would be employed to avoid impacts. The Air Force would create a buffer zone of no less than 100 feet between the wetland boundary and the construction zone of influence.

4.7.1.3 Fauna Including Migratory Birds

Some fauna in the project area would be impacted by the implementation of the proposed project. Smaller less mobile animals (i.e., mice, ghost crabs) could suffer injury or death as a result of project activities. However, more mobile animals (i.e., raccoons, birds) would likely vacate the area upon commencement of project activities.

Migratory birds are protected under the MBTA and Executive Order 13186, which requires Federal agencies to protect migratory birds and their habitats. A variety of migratory birds are expected to occur in the general project area; however, no migratory birds are known to nest in this area. The beach adjacent to and within the proposed project area historically has been relatively dynamic with the width and elevation fluctuating significantly from year to year. Historically, no shorebirds have been known to nest in the proposed project area and likely nest in more stable portions of the beach, such as just south of the tip of the Cape (kilometers 6-8) and a number of sites on the northern portion of the CCAFS beach (kilometers 14-21). However, Wilson's plover was observed nesting in the project area in 2004.

It is not anticipated that nesting sea or shorebirds would be present on the proposed project beaches during months that excavation activities would occur (November – April). Birds that are loafing or feeding in the proposed project area would be expected to vacate the area upon commencement of excavation and other project activities. Any impacts to birds would be expected to be minor and short-term.

To ensure potential impacts to nesting sea and shore birds are avoided, the project area would be surveyed (for nesting birds) 30 days prior to the commencement of any excavation activities. This survey would be conducted in conjunction with gopher tortoise surveys. If nesting shorebirds are discovered prior to or during excavation activities, the Air Force would promptly stop excavation activities in the immediate area of nesting birds and the project would be reassessed with respect to impacts to nesting sea and shorebirds by CCAFS biologists.

4.7.1.4 Threatened and Endangered Species

The protection of federally listed species is regulated under the ESA. Section 7 of the ESA dictates that federal actions should not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. Furthermore, Section 7 (a) of the ESA requires formal consultation with the USFWS whenever a federal proponent anticipates taking any action that may affect a listed species or its habitat.

Potential impacts to threatened and endangered species discussed in this section are based on professional judgment as well as previous consultation with the USFWS pertaining to other projects at the CCAFS. The Air Force has completed formal consultation with the USFWS with respect to the proposed project. Correspondence is provided in **Appendix 4**. Additional information provided by other agencies is also included in **Appendix 4**. Based on USFWS consultation, the project "may affect" the southeastern beach mouse, and "may affect but not likely to adversely affect" the eastern indigo snake, loggerhead, green, and leatherback sea turtles provided measures are included in the project to avoid and minimize potential take of the indigo snake, loggerhead, green, and leatherback sea turtles.

In addition, the gopher tortoise, a state listed species, is known to occur in the project area. Potential impacts to this species, as well as other state listed species that potentially occur in the proposed project area, are discussed below. No marine mammals or fish would be impacted by the proposed project, as no water-borne equipment would be used during excavation or transportation. All activities would be conducted above the mean high water line.

Southeastern beach mouse – The proposed project would likely result in the inadvertent injury or death of southeastern beach mice that are living within areas of excavation. As work continued, it is possible that mice would relocate away from areas that were being excavated; however, it is likely that "takes" would occur. Following excavation activities, the beach would be graded and a small dune would be created. As a result of the excavation activities, minor loss of beach mouse habitat is anticipated to occur; only approximately 24 acres of beach/dune habitat would be impacted with full execution of the proposed project. In the long-term, as the beach profile stabilized, new habitat would be created and the beach mouse would likely recolonize the previously excavated area. Creation of the dune structure landward of the excavation would help offset loss of dune habitat associated with the excavation. Any permits (i.e., Incidental Take Permit) required by the State or USFWS will be obtained prior to project implementation.

Based on the 19 October 2005 Biological Opinion (BO), amended 20 July 2006 (refer to **Appendix 4**), the proposed project is not likely to jeopardize the continued existence of the southeastern beach mouse. No critical habitat has been designated for this species; therefore, none would be affected by the proposed project.

Several Reasonable and Prudent Measures were identified in the BO to minimize the take of beach mice. The transportation, operation and staging of vehicles, equipment and other project-related materials and supplies must be conducted in a manner that avoids death or injury of beach mice. Prior to the hurricane season (1 June), once every two years, mice will be trapped within the project area and relocated to suitable habitat within the Archie Carr National Wildlife Refuge. In between this two-year trapping event and prior to any excavation, mice will be trapped in the area of direct impact for two nights and relocated to suitable habitat at least 1000 feet from the project area. The dune will be vegetated using native plants. For subsequent excavation activities, the re-built dune will be avoided. The Air Force will determine the survivability of relocated mice on CCAFS by tagging mice and conducting a second trapping event one month following initial relocation.

Loggerhead, Green, and Leatherback Sea Turtles - As discussed in **Section 3.7.4**, sea turtles (primarily loggerheads) often nest along the beaches within the proposed project area. However, as discussed previously, the stretch of beach where the proposed project is located consistently has the lowest density of sea turtle nests (approximately 20 per kilometer) at

CCAFS. Impacts associated with the proposed project to sea turtles would be minimized and/or avoided, because excavation activities would occur outside of turtle nesting season.

Excavation activities will not occur from 1 May through 31 October and no construction equipment will be stored on the beach during this time frame. If excavation activities are proposed to occur 1 March through 30 April, daily early morning surveys for loggerhead, green and leatherback sea turtle nests must be conducted during this time or until completion of the project (whichever is earliest), and nests must be avoided. If excavation activities are proposed to occur at night 1 March – 30 April, nighttime surveys for leatherback nests must be conducted during this time frame and all nests must be clearly marked and avoided. From 1 March through 30 April, staging areas for construction equipment must be located off the beach to the maximum extent practicable. Direct lighting of the beach and near shore waters must be limited to the immediate construction area during 1 March – 30 April. Lighting on equipment must be minimized through reduction, shielding, lowering and appropriate placement to avoid excessive illumination of the waters surface and nesting beach.

In addition to potential impacts during excavation activities, the proposed project would affect the current beach profile, which could affect the nesting habitat available to sea turtles in the project area in the future. The profile of the beach in this area is expected to equilibrate and nesting habitat is not expected to decrease in the long-term.

Any permits (i.e., Incidental Take Permit) required by the State or USFWS will be obtained prior to project implementation.

Eastern Indigo Snake – The eastern indigo snake may be present in gopher tortoise burrows that occur within the project area; however, the eastern indigo snake would be expected to vacate the area once excavation activities began. The eastern indigo snake protection/education plan previous developed for CCAFS will be utilized and presented to all construction personnel. Educational signs will be posted throughout the construction area and will include a description of this species, its habitats and protection; instructions not to inure, harm harass or kill this species; directions to cease clearing activities and allow any snakes sufficient time to move away from the site; and telephone numbers of personnel to be contacted if dead or injured indigo snakes are encountered.

Any permits (i.e., Incidental Take Permit) required by the State or USFWS will be obtained prior to project implementation.

Piping plover – The piping plover has the potential to occur in the proposed project area during the non-breeding season (July-March). However, this species would be expected to vacate the area upon commencement of project activities. This species would not be expected to incur any impacts as a result of the proposed project.

American oystercatcher – This species likely occurs in the general project area but does not nest in Brevard County. Oystercatchers feed on oysters, clams, and mussels, which occur in intertidal areas. Because the proposed project occurs above mean high water, this species would not be expected to incur any impacts.

Osprey – CCAFS supports a large population of ospreys; however, there are currently no active osprey nests within the proposed project area. Due to the lack of structures present in the project area which could be used by an osprey for nesting, it is unlikely that an osprey would

nest in the proposed project area. Therefore, this species would not be expected to incur any impacts as a result of the proposed project.

Brown pelican – Brown pelicans are common along waterways in Brevard County; however, the specific project site does not provide ideal habitat for this species for feeding, loafing, or nesting. If present in the project area, this species would be expected to vacate the area upon commencement of project activities. This species would not be expected to incur any impacts as a result of the proposed project.

Black skimmer –Black skimmers nest in May through August in Florida. No nesting colonies occur within the proposed project area. This species has been observed loafing on the beach in the project area. Typically black skimmers take flight when approached or disturbed. Therefore, this species would not be expected to incur any impacts as a result of the proposed project.

Least tern –Least terns nest along sandy beaches on the southern portion of CCAFS and on gravel rooftops in various areas of CCAFS. However, least terns are not known to nest in the proposed project area. Least terns typically nest on CCAFS between April and August. To avoid impacts to nesting birds, surveys will be conducted approximately two weeks prior to any excavation activities to ensure nesting birds are not present within the project area. Areas containing nesting birds would be avoided until after nesting season. If nesting birds are encountered during any project activities, those activities would be halted until CCAFS biologists assess the situation and potential impacts.

Gopher Tortoise –Due to their presence within the proposed project area, gopher tortoises have the potential to be impacted during all phases of the proposed action. Gopher tortoise burrows may be collapsed accidentally in the project area by heavy equipment. A collapsed burrow entrance could result in death of gopher tortoises that are trapped in the collapsed burrow. There is also a potential for gopher tortoises to be crushed by heavy machinery or trucks in the general project area. A survey for gopher tortoise burrows will be conducted prior to any excavation activities and any tortoises found to be present would be relocated out of the area in accordance with existing gopher tortoise relocation permit for CCAFS.

Listed plants – At least one state listed plant species (sea lavender) has been observed within the project area. No federally listed plants were found within the project area during biological surveys conducted in 2007. All vegetation within the proposed project area would be removed during excavation activities. Native vegetation would be planted on the dune structure following excavation. Due to the dynamic nature of the beach, additional vegetation would be expected to colonize the area following project activities.

4.7.2 No Action

Under the No Action Alternative, there would be no disturbance to vegetation or the natural environment at the CCAFS. Therefore, there would be no potential impacts to listed species.

4.8 Socioeconomics and Land Use

4.8.1 Proposed Action

4.8.1.1 Land Use and Public Access

Implementation of the proposed project would change the shape and profile of the beach and dune system within the proposed project area; however, land use would not change. The area would remain undeveloped. Implementation of the proposed project would not restrict any currently occurring activities or planned future activities on CCAFS.

4.8.1.2 Aesthetic Resources

The presence of equipment on-site as well as excavation that would occur as a result of the proposed action would affect the appearance of the beach and dune systems within the project area. It is anticipated that this impact would be short term in duration due to continued accretion in this portion of the beach. In addition, no structures would be built in conjunction with the proposed project. Therefore aesthetic resources in this area would not be negatively affected in the long-term. Revegetation of the disturbed areas would occur naturally, rectifying impacts to dune vegetation and visual resources.

4.8.1.3 Environmental Justice

No low-income communities and no minority communities exist at CCAFS or offsite near the installation. Implementation of the Proposed Action would have no adverse effect on human health and the environment of the areas surrounding the installation, specifically with regard to disadvantaged populations.

4.8.1.4 Protection of Children

Because children are not present at or near the proposed project area, implementation of the Proposed Action would have no adverse effect on children.

4.8.2 No Action

As no actions are proposed under the No Action Alternative, no impacts are anticipated.

4.9 Traffic and Transportation

4.9.1 Proposed Action

The amount of material hauled from CCAFS to PAFB at one time will depend on need, but the maximum number of trucks simultaneously hauling between CCAFS and PAFB will be 13. This would not be expected to cause any type impact to local traffic patterns. Thirteen 20 cy dump trucks could haul approximately 1,300 total cy per day, assuming a 1.5 hour round trip travel time between the borrow site and fill areas.

4.9.2 No Action

As no actions are proposed under the No Action Alternative, no impacts are anticipated.

4.10 Hazardous Materials and Waste

4.10.1 Proposed Action

No hazardous materials or waste are currently located within the proposed project area. During excavation and haul activities associated with the proposed project, heavy equipment would be brought on-site. With the introduction of heavy equipment on-site, there would be a potential for oil, hydraulic fluid and lubricants, and fuel spills. To prevent potential contamination/spills on the beach, contractors would be required to refuel equipment off-site in the upland equipment staging area. Spill equipment would be required in all refueling areas. All hydraulic lines would be checked daily and vehicles and equipment parked in staging areas would be checked daily for leaks and/or spills.

4.10.2 No Action

As no actions are proposed under the No Action Alternative, no impacts are anticipated.

4.11 Cultural Resources

4.11.1 Proposed Action

As no cultural resources are known to occur within the limits of the project site, no impacts would be expected under the Proposed Action Alternative. If any historical or cultural resources were uncovered during the course of project implementation, activities would cease until a qualified archaeologist and/or historian could assess the significance of the finding.

4.11.2 No Action

As no actions are proposed under the No Action Alternative, no impacts are anticipated.

4.12 Cumulative Effects

Cumulative effects are defined as, “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions (40 CFR §1508.7).” Resource areas (i.e., air quality, noise, water resources, socioeconomics, land use, traffic and transportation, hazardous materials and waste, and cultural resources) that would sustain no or only minor, short-term impacts would not be expected to sustain significant cumulative effects and are, therefore, not discussed in this section. Resource areas that would be expected to sustain moderate impacts that warrant further cumulative assessment include: geology, topography, and soils and biological resources. Cumulative effects to these resources are discussed below.

Past, present, and planned projects located in the general vicinity of the proposed borrow area include:

- Construction of Canaveral Harbor and Inlet (1950-1954)
- North Jetty Permanent Sand-Tightening and Jetty Extension (2004-2005), and
- Canaveral Harbor Sand Bypass System (1995-ongoing).

As discussed previously, the Canaveral Sand Bypass System includes the periodic dredging (approximately every 6 years) of the near-shore area north of the Canaveral Harbor entrance and transporting the material via pipe to beaches south of the Canaveral Harbor Entrance.

The above listed projects in conjunction with the proposed action would have an effect on the alongshore transport of sands in the project area. As discussed in **Section 4.5.1**, effects of the proposed action in conjunction with the effects of the currently permitted USACE Sand Bypass Project have been analyzed. This analysis indicates that cumulative effects of the two projects would be similar in nature to the two projects individually.

The proposed action would augment sand bypassing across the inlet. In particular, it would bypass sediment that is otherwise impounded against the inlet's north jetty, and specifically above the mean high water line. Sand impounded against the improved jetty will be prevented from reaching the navigation channel; however, it would not otherwise be dredged and bypassed by the sand bypass project because the sand is principally above the mean high water line.

The present scope of the Canaveral Harbor Federal Sand Bypass Project is to bypass the equivalent of 156,000 cy/yr to the shoreline south of the inlet. Kriebel *et al.* (2002) estimate the pre-inlet southerly transport rate at this location as about 210,000 cy/yr. This quantity also approximates the measured rate of sand accumulation at the north side of the inlet between sand bypass events (200,000 to 240,000 cy/yr). There is thus about 54,000 cy/yr of sand, on average, that can be bypassed from the shoreline north of the inlet to the beaches south of the inlet – above and beyond the USACE's Federal Sand Bypass project – without inducing net loss to the updrift, CCAFS shoreline. This shoreline is, in fact, some 500 to 1000 feet advanced from its pre-inlet location, due to anomalous accretion of sand against the inlet's north jetty since the inlet's construction in 1950-54.

The proposed activity, which is anticipated to transfer much less than 54,000 cubic yards per year, would thus not result in a net loss of the borrow area shoreline. It would, instead, serve to bypass sand that is artificially impounded on the north side of the inlet.

5.0 CONCLUSIONS AND ENVIRONMENTAL IMPACTS THAT CANNOT BE AVOIDED

This EA examines the potential environmental, cultural, and socioeconomic impacts associated with the Proposed Action and No Action Alternatives. Anticipated impacts associated with the proposed project primarily include impacts to biological resources and the existing beach and dune resources. A summary of anticipated impacts and mitigation requirements are included in **Table 5-1**.

Implementation of the proposed project would remove current vegetation from the project area and impact local populations of wildlife including federally-listed and state-listed species. Impacts to listed species would be minimized and avoided where practicable and protection measures would be implemented. Based on USFWS consultation, the project "may affect" the southeastern beach mouse, and "may affect but not likely to adversely affect" the eastern indigo snake, loggerhead, green, and leatherback sea turtles provided measures are included in the project to avoid and minimize potential take of the indigo snake, loggerhead, green, and leatherback sea turtles.

Implementation of the proposed project would also impact the existing beach and dune system in the project area. However, the equilibration effect (profile response to major storm events) is expected to be limited to the project area. The small dune to be constructed along the landward edge of the borrow area is not predicted to be undercut or significantly overwashed by the equilibrium storm event. The beach system in the project area would be expected to continue to be a dynamic environment, with or without implementation of the proposed project.

All permits required by the USFWS or the State would be obtained prior to project implementation and all terms and conditions stipulated in the BO would be adhered to.

This EA concludes that the proposed action would not significantly impact the continued existence of any species or have significant impacts to other resource areas examined in this EA.

Table 5-1 Summary of Impacts and Protection Measures

Resource Area	Proposed Action Alternative	Proposed Protection Measures	No Action Alternative
Air Quality	**Minor impacts** include vehicle emissions and wind-blown sand associated with loading, unloading, and transporting material.	Water down haul roads and cover loaded truck beds with secured geotextile fabric.	No impacts.
Noise	**Minor impacts** include additional noise associated with trucks and heavy equipment in the project area and haul route to PAFB.	None required.	No impacts.
Geology, Topography, and Soils	**Minor impacts** include sand removal from beach face as a result of excavation activities and likely shoreline recession.	Construct dune feature landward of excavation.	Continued sand accumulation updrift of the Canaveral Harbor north jetty.
Water Resources	**Minor impacts** could include minor leaks from equipment.	No refueling will occur on the beach. Spill kits will be available in refueling areas. Hydraulic lines will be inspected daily.	No impacts.
Biological Resources	**Minor impact** to vegetation communities and wildlife, including threatened and endangered species in project area. Biological resources within project area would most likely be lost in the short-term.	Implement sea turtle, eastern indigo snake, southeastern beach mouse, and gopher tortoise protection measures as stipulated in BO. Plant constructed dune with native vegetation to restore any lost dune communities.	No significant impacts. Brazilian pepper likely to continue spreading in project area.
Socioeconomics	**No impacts** anticipated.	None required.	No impacts.
Land Use	**No impacts** anticipated.	None required.	No impacts.
Traffic and Transportation	**Minor impact** includes additional movement of heavy equipment and trucks on roads.	None required.	No impacts.
Hazardous Materials and Waste	**Potential impacts** associated with spills.	No refueling will be allowed on the beach. Spill kits will be in place.	No impacts.
Cultural Resources	**No impact** anticipated.	None required.	No impact.

6.0 AGENCIES/PERSONS CONSULTED

Both NEPA and CEQ regulations require intergovernmental notifications prior to finalizing any detailed statement of environmental impacts. Through the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process, the Air Force has notified relevant federal, state, and local agencies (through the Florida State Clearinghouse) and allowed them sufficient time to make known their environmental concerns specific to this proposed action. Comments and concerns submitted by these agencies during the IICEP process have been incorporated into the analysis of potential environmental impacts conducted as part of the EA and presented in its final findings.

In addition, Brevard County Board of County Commissioners has indicated that the county does not exert regulatory jurisdiction on Federal lands and development activities on Federal property does not require review by Brevard County.

All correspondence is included in **Appendix 4**.

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APPENDIX 1

SEDIMENT SAMPLE DATA AND COMPATIBILITY ANALYSIS FOR PROPOSED CCAFS EMERGENCY UPLAND BORROW SOURCE

Appendix 1:
Sediment Sample Data and Compatibility Analysis for Proposed Cape Canaveral Air Station Emergency Upland Borrow Source

Prepared by
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Sediment Data. **Table 1-1** summarizes the grain size distribution data for 25 samples taken at 16 locations within the proposed borrow site (**Figure 1-1**). The samples were collected from auger borings conducted by Amec Earth and Environmental Inc. from December 16th to 21st, 2003. **Table 1-2** summarizes the grain size distribution data along the Patrick Air Force Base (PAFB) shoreline for both the *native* (pre-fill[1]) and *existing* (post-fill) conditions. The grain size distributions for the *native* beach material are composites (averages) from a variety of samples collected between 1971 and 2001 along various portions of the beach profile. The grain size distribution for the *existing* condition is a composite of the in-place fill material collected at a number of locations along the PAFB shoreline immediately following construction of the 2001 beach fill. All values, in both Tables 1-1 and 1-2, are by weight. **Table 1-3** summarizes the carbonate (shell) fraction for the native beach, existing beach and three borrow site sediment samples, as determined by carbonate burn. Physical descriptions of the individual borrow site samples are summarized in **Table 1-4**. An organic layer, when present, is limited to the back beach and consists of 12" or less of the surface sediments.

Compatibility. **Table 1-5** summarizes the median and other grain size statistics for the native beach, existing beach and borrow site sediment samples. **Figure 1-2** depicts the grain size distribution for all of the borrow site samples along with the native and existing beach composites. There is a wide and generally random variation in the borrow site samples with no significant alongshore or vertical grain size trends. Figure 1-2 indicates that the borrow site composite (d_{50} = 0.41 mm) is slightly coarser than the native berm composite (d_{50} = 0.34 mm) and the existing beach composite (d_{50} = 0.39 mm) and significantly coarser than the overall native beach profile composite (d_{50} = 0.18 mm). The computed overfill factor is 1.0; and the proposed borrow sand is fully physically compatible with the native/existing beach sand. The borrow sand is very similar in grain size distribution and carbonate (shell) fraction to the existing beach sand placed in 2000/2001. This prior fill sand has demonstrated excellent performance for marine turtle nesting success. It is therefore reasonably anticipated that the proposed CCAS upland borrow material will be well suited for marine turtle nesting.

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[1] Approximately 560,000 cubic yards of sand were placed along the PAFB shoreline between December 2000 and April 2001.

Table 1-1: Borrow site grain size distribution (PAFB-CCAS).

Sample Location	Depth Below Grade (ft)	Approx Surface Elevation (FT-NGVD)	Percent Passing													
			1/2" (12.5)	3/8" (9.5)	No 4 (4.75)	No. 10 (2.00)	No. 30 (0.60)	No. 40 (0.425)	No. 50 (0.30)	No. 60 (0.250)	No. 80 (0.180)	No.100 (0.150)	No. 120 (0.125)	No. 140 (0.106)	No. 170 (0.090)	No. 200 (0.075)
CCAFS29A	10	8.2	100.0	100.0	99.1	88.9	48.4	NA	13.1	9.1	4.6	2.5	1.5	1.0	0.8	0.7
CCAFS29B	10	6.2	100.0	100.0	98.2	93.9	81.4	NA	68.8	64.2	50.4	25.3	12.4	4.2	1.1	0.5
CCAFS29C	10	6.0	100.0	100.0	98.8	98.2	95.2	86.3	NA	53.2	33.6	16.4	7.5	2.6	0.8	0.4
BC5A	10	10.5	100.0	100.0	99.7	96.7	67.5	NA	NA	9.4	3.3	1.7	1.0	0.7	0.6	0.5
BC5B	0-2	7.4	100.0	100.0	99.6	95.8	64.0	NA	20.8	14.4	6.0	2.3	0.9	0.4	0.2	0.2
	2-4	7.4	100.0	100.0	99.3	91.5	37.4	NA	8.7	8.0	2.7	1.2	0.5	0.3	0.2	0.2
	4-6	7.4	100.0	100.0	98.2	89.7	51.8	NA	13.0	9.1	4.7	2.4	1.1	0.5	0.3	0.2
	8-10	7.4	100.0	100.0	98.5	92.7	69.0	NA	31.2	24.4	14.1	6.2	2.7	0.9	0.4	0.3
BC5C	10	4.0	100.0	100.0	98.1	93.2	72.4	60.0	NA	39.9	26.5	11.2	3.9	1.3	0.5	0.4
CCAFS30A	10	10.8	100.0	100.0	99.5	96.7	68.2	NA	25.2	20.2	10.9	4.5	1.8	0.7	0.3	0.2
CCAFS30B	10	9.1	100.0	100.0	97.9	92.4	61.2	NA	24.2	17.6	7.3	2.9	1.2	0.7	0.5	0.4
CCAFS30C	0-2	6.0	100.0	100.0	99.8	98.7	89.0	NA	69.1	63.7	42.1	12.7	5.6	2.0	0.7	0.4
	2-4	6.0	100.0	100.0	99.4	96.3	87.8	NA	73.6	69.0	44.7	12.2	4.6	1.7	0.8	0.5
	4-6	6.0	99.0	NA	98.7	96.6	86.2	NA	54.4	45.9	24.9	7.9	3.2	1.1	0.4	0.3
	8-10	6.0	100.0	100.0	99.8	99.1	88.4	NA	70.5	35.7	16.7	6.1	2.3	1.0	0.5	0.4
BC6A	10	9.3	100.0	100.0	99.4	96.7	68.7	43.1	NA	12.3	5.6	2.5	1.1	0.6	0.4	0.3
BC7A	10	11.8	100.0	100.0	99.2	95.9	67.9	NA	17.8	12.0	4.8	2.0	0.9	0.5	0.3	0.3
BC7B	10	6.9	100.0	100.0	99.0	92.9	70.8	NA	41.3	35.6	24.5	12.3	5.5	2.0	0.8	0.5
BC8A	10	11.6	100.0	100.0	99.5	96.9	64.3	37.8	NA	10.9	4.4	1.9	0.9	0.6	0.4	0.3
BC9A	10	10.7	100.0	100.0	98.1	85.5	52.4	NA	14.0	9.8	4.4	2.4	1.4	0.9	0.7	0.6
BC9B	0-2	11.5	100.0	100.0	99.9	97.7	61.7	NA	10.3	6.6	2.5	1.0	0.4	0.2	0.0	0.0
	2-4	11.5	100.0	100.0	99.9	98.8	76.3	NA	NA	15.8	5.7	2.4	1.1	0.7	0.6	0.5
	4-6	11.5	100.0	100.0	99.0	95.5	71.7	NA	27.0	20.2	9.4	4.0	1.6	0.7	0.4	0.3
	8-10	11.5	100.0	100.0	99.9	97.9	66.6	NA	20.8	15.7	7.9	3.6	1.8	1.2	1.0	0.8
CCAFS33A	10	11.0	100.0	100.0	99.8	96.8	64.6	36.6	NA	12.5	5.7	2.8	1.4	1.0	0.7	0.6

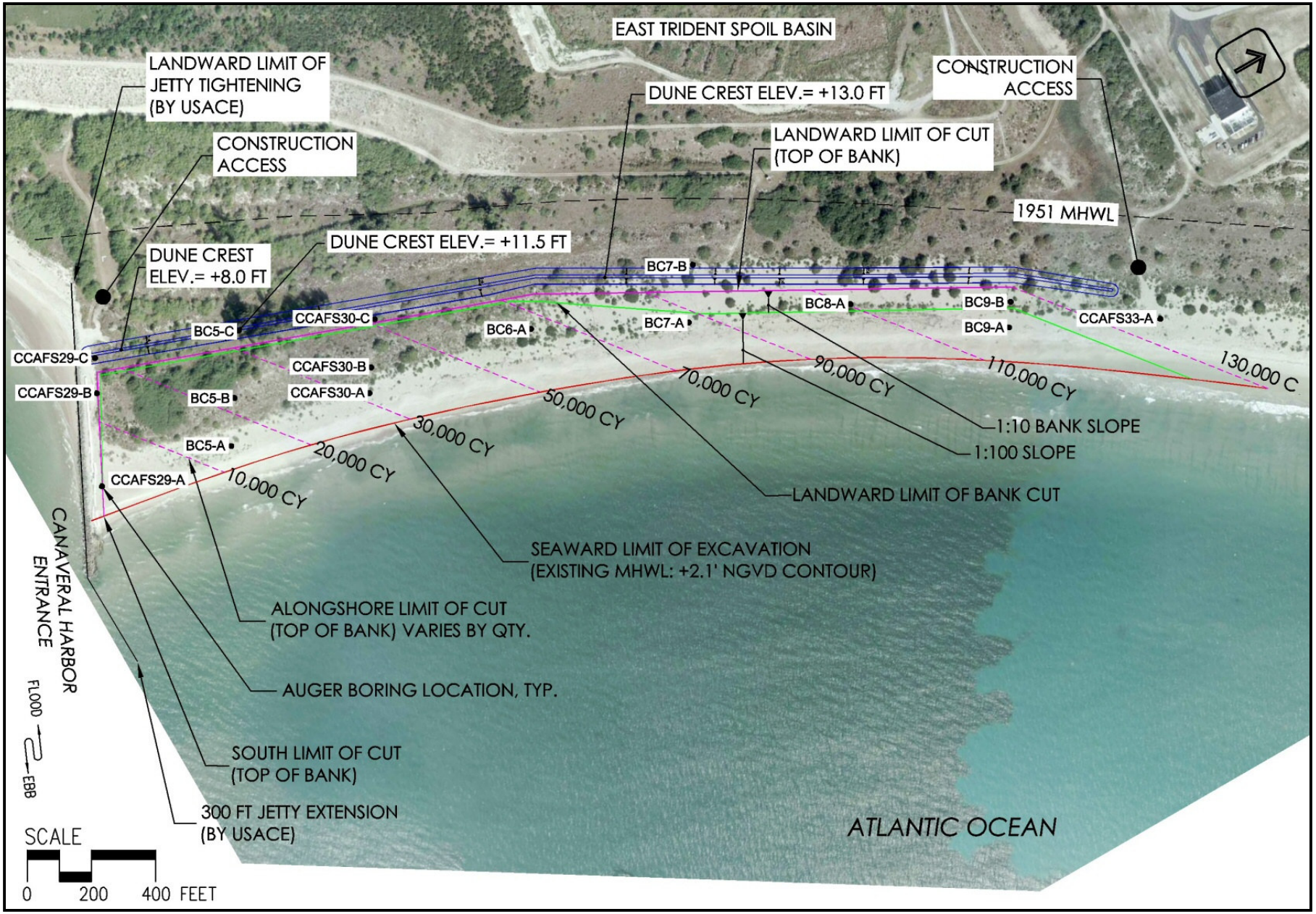

Figure 1-1: PAFB-CCAS borrow site auger boring sample locations.

Table 1-2: Native beach grain size distribution (PAFB-CCAS).

Sample Location	Percent Passing											
	No. 4 (4.75)	**No. 10 (2.00)**	**No. 20 (0.85)**	**No. 30 (0.60)**	**No. 40 (0.425)**	**No. 50 (0.300)**	**No. 60 (0.250)**	**No. 70 (0.212)**	**No. 80 (0.180)**	**No. 100 (0.150)**	**No. 140 (0.106)**	**No. 200 (0.075)**
Native												
Berm Composite	NA	99.4	92.7	87.9	68.4	39.6	31.1	20.6	12.3	4.5	0.6	0.2
Intertidal	NA	98.0	91.9	87.5	79.5	69.1	60.1	54.0	41.9	22.1	2.8	0.5
Subtidal	NA	99.6	98.7	97.6	96.8	95.7	94.7	91.9	86.5	59.4	17.2	3.5
Profile Composite	NA	98.8	94.3	90.9	82.6	70.3	64.5	58.7	51.4	35.2	12.4	3.5
Existing												
PAFB (Post-Fill)	98.4	95.6	88.7	78.6	59.1	26.0	13.8	4.5	2.6	1.1	0.6	0.0

Table 1-3: Borrow site, existing beach and native beach carbonate (shell) fraction.

Sample		Percent $CaCO_3$
Native PAFB Berm (Pre-Fill)		31.0%
Native PAFB Profile (Pre-Fill)		NA
Existing PAFB (Post-Fill)		40.7%
Borrow Site Samples	CCAFS33A	50.2%
	BC5B	67.7%
	BC7A	36.9%

Table 1-4: PAFB-CCAS borrow site auger boring sample physical descriptions.

SAMPLE ID #	DATE	DEPTH	AREA DESCRIPTION / SAMPLE DETAILS (Characteristics, etc.)
CCAFS29A	12/17/03	10 FT. comp	No organic soil layer (beach). *1~4':* medium coarse light gray sand, damp to wet. *4~8':* medium coarse sand with shell fragments, wet to a watery mix. *9~10':* very watery mix with many shell fragments.
CCAFS29B	12/19/03	10 FT. comp	No organic soil layer (beach). Heavy vegetation noted immediately adjacent to bore area. *1~4':* fine light gray sand, damp. *4'*: gray mud (muck?) *5~8'*: fine damp sand with trash & wood debris. (Comment: noting location of bore to water ship channel; the noted debris is probably dredge material?) *9~10':* very watery mix with many shell fragments to water.
CCAFS29C	12/19/03	10 FT. comp	No organic soil layer (beach). Heavy vegetation noted immediately adjacent to bore area. *1~4'*: fine light gray sand, dry. *4':* vegetation roots and alot of ants! *5~7':* fine damp sand with trash & wood debris. (Comment: noting location of bore to water ship channel; the noted debris is probably dredge material?) *7':* gray mud (muck?) *8':* watery mix.
BC5A	12/20/03	10 FT. comp	Minor beach vegetation in area with less than 6" organic soil layer. *1~5':* medium coarse light gray sand, damp. 5~*10':* medium coarse sand with shell fragments, damp. *Note: a security warning sign was buried, save 12" at top from drifting~duning sand. Replacement sign erected in close proximity was 8' in height.
BC5B	12/20/03	2 FT.	Medium beach vegetation in area with 12" organic soil layer. *1~2':* fine light gray sand, dry with few vegetation roots.
BC5B	12/20/03	4 FT.	Medium beach vegetation in area with 12" organic soil layer. *2~4':* medium course light gray sand, damp with slight shell fragments.
BC5B	12/20/03	6 FT.	Medium beach vegetation in area with 12" organic soil layer. *4~6':* medium course light gray sand, damp with slight shell fragments.
BC5B	12/20/03	6 FT.	Burn Sample *Note: Reference above.
BC5B	12/20/03	8 FT.	Medium beach vegetation in area with 12" organic soil layer. *6~8':* medium course light gray sand, damp with few shells.
BC5C	12/20/03	10 FT. comp	Heavy vegetation and trees in area with an average 12" organic soil layer (deeper around trees). *1~4':* medium coarse tan sand with shells, dry. 4~*5':* medium coarse tan sand with shells, damp. *5~6':* medium coarse sand and grey mud (muck) with shells, watery mix. *6':* Water. After 30 minutes of 'attempting'.....could go no deeper due to 'caving' from the water.
CCAFS30A	12/19/03	10 FT. comp	Minor beach vegetation in area with less than 6" organic soil layer. *1~2':* fine coarse lite gray sand, dry. *2~10':* medium coarse grey sand, damp.
CCAFS30B	12/19/03	10 FT. comp	Beach vegetation in area with 6" organic soil layer. *1~2':* fine coarse lite tan sand, dry. *2~4'*: medium coarse grey sand, damp. *4~10':* medium coarse grey sand, damp with shell fragments.
CCAFS30C	12/19/03	2 FT.	Thick beach vegetation in area with 8" organic soil layer. *1~2':* fine coarse lite tan sand, dry.
CCAFS30C	12/19/03	4 FT.	Thick beach vegetation in area with 8" organic soil layer. *1~4':* fine coarse lite tan sand with slight shell fragments, dry.
CCAFS30C	12/19/03	6 FT.	Thick beach vegetation in area with 8" organic soil layer. *4~6':* fine coarse lite tan sand with slight shell fragments, damp.
CCAFS30C	12/19/03	8 FT.	Thick beach vegetation in area with 8" organic soil layer. *6~8':* fine coarse lite grey sand with slight shell fragments, very wet.

Table 1-4 (cont.): PAFB-CCAS borrow site auger boring sample physical descriptions.

BC6A	12/18/03	10 FT. comp	Thick beach vegetation in area with 6+" organic soil layer. *1~2':* fine coarse tan sand, dry. *2~4':* fine coarse tan sand, damp. *4~5':* fine coarse tan sand with some shell fragments, damp. *6':* fine grain grey~tan sand with shell fragments, damp. *6~10':* medium coarse grey sand with shell fragments, damp.
BC7A	12/17/03	10 FT. comp	Minor beach vegetation in area with less than 6" organic soil layer. *1~3':* medium coarse lite gray sand, damp. *3~10'*: medium coarse grey sand with shell fragments, damp.
BC7A	12/17/03	10 FT. comp	Burn Sample *Note: Reference above.
BC7B	12/17/03	10 FT. comp	Beach vegetation in area with 6" organic soil layer. Appears to be a dry sand ravine (creek bed?). *1~3':* fine dark tan sand, dry. *3~4'*: coarse dark tan sand with shell fragments, damp. *4~6':* coarse dark tan sand, very wet to a watery mix. No shells. *6~10':* Water.....resulting with boring 'caving'.
BC8A	12/18/03	10 FT. comp	Beach vegetation in area with 6" organic soil layer. *1~3':* medium coarse lite grey sand with vegetation vine root fragments, dry. *3~4':* fine dirty white sand, dry. *4~10':* fine tan sand, damp.
BC9A	12/18/03	10 FT. comp	No organic soil layer (beach). *1~4':* medium coarse light gray sand, damp. *4~5':* medium coarse light grey sand with shell fragments, damp. *5~10':* coarse light grey sand many shell fragments, damp.
BC9B	12/18/03	2 FT.	Thick beach vegetation in area with 6" organic soil layer. *1~2':* fine coarse lite grey sand, damp.
BC9B	12/18/03	4 FT.	Thick beach vegetation in area with 6" organic soil layer. *2~4':* fine coarse lite grey sand, damp.
BC9B	12/18/03	6 FT.	Thick beach vegetation in area with 6" organic soil layer. *4~6':* fine coarse lite grey sand with shell fragments, damp.
BC9B	12/18/03	8 FT.	Thick beach vegetation in area with 6" organic soil layer. *6~8':* fine coarse lite grey sand with shell fragments, damp.
CCAFS33A	12/17/03	10 FT. comp	No organic soil layer (beach). *1~2':* medium coarse light gray sand, dry. *2~6':* medium coarse grey sand, damp. *6~10':* medium coarse grey sand with shell fragments, wet.
CCAFS33A	12/17/03	10 FT. comp	Burn Sample *Note: Reference above.

Table 1-5: Borrow site, existing, and native beach grain size statistics (PAFB-CCAS).

Sample	Grain Size (mm)			Percent Fines (<0.074 mm)
	d_{16}	d_{50}	d_{84}	
Native PAFB Berm (Pre-Fill)	0.20	0.34	0.55	0.2%
Native PAFB Profile (Pre-Fill)	0.12	0.18	0.45	3.5%
Existing PAFB (Post-Fill)	0.26	0.39	0.72	0.0%
Borrow Composite	0.18	0.41	1.23	0.4%

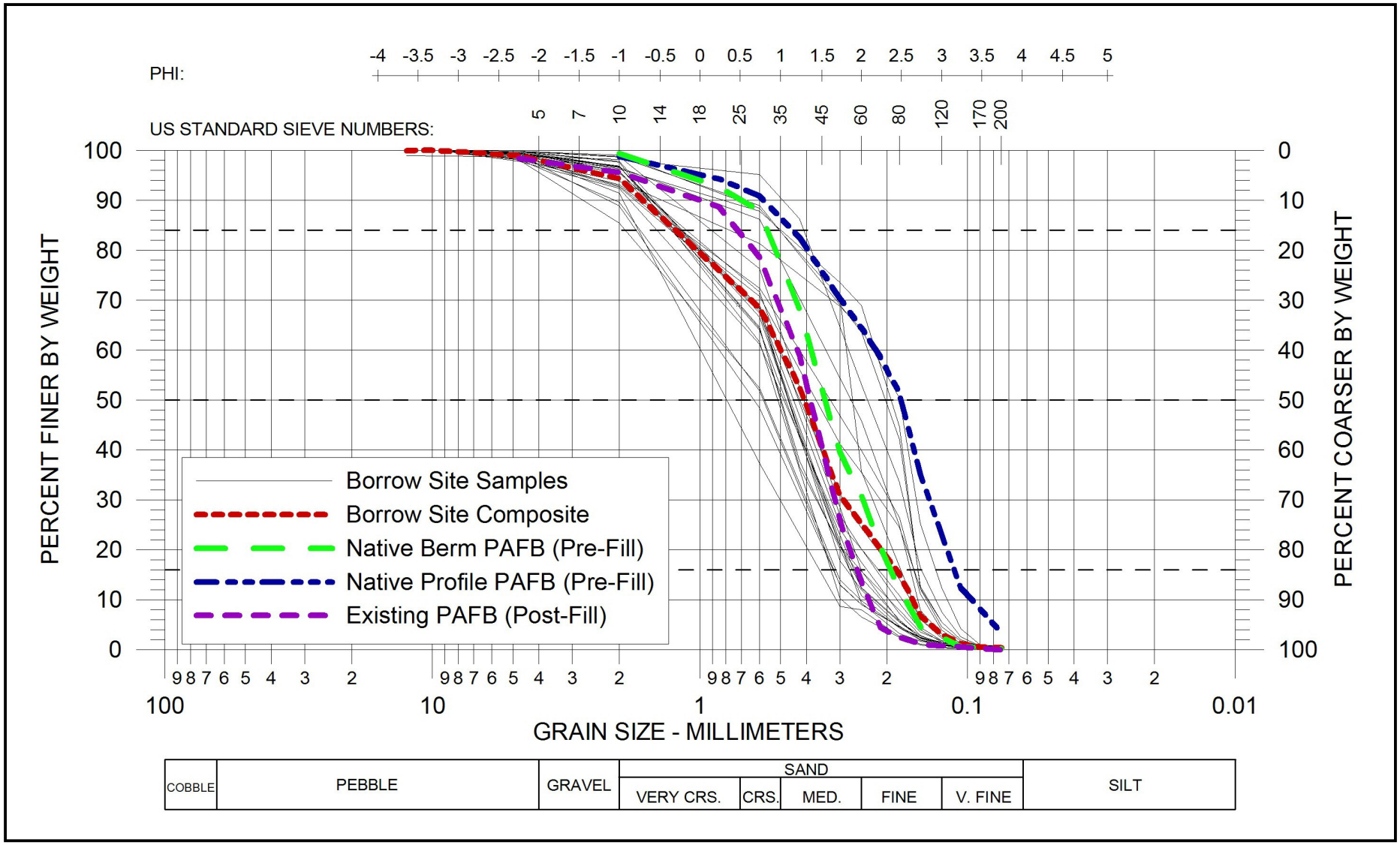

Figure 1-2: PAFB-CCAS grain size distributions.

APPENDIX 2

CROSS-SHORE SEDIMENT TRANSPORT MODELING OF PROPOSED CCAFS EMERGENCY UPLAND BORROW SOURCE

Appendix 2:
Cross-shore Sediment Transport Modeling of the Proposed Cape Canaveral Air Station Emergency Upland Borrow Source

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Abstract. The cross-shore profile response of the beach to the proposed upland sand borrow area was predicted using the numerical model SBEACH. The model results suggest that a typically severe (10- to 20-year) storm event is not expected to result in erosion of the CCAS uplands under either excavation scenario. The simulated results are similar to that which would normally result in full equilibration of the Corps' sand bypass dredge cut. Further, these model results do not suggest any impacts to the profile (above +2 ft, NGVD) beyond those directly associated with construction of the CCAS project.

Introduction. The cross-shore profile response of the Cape Canaveral Air Station (CCAS) beach to the excavation of the proposed upland sand borrow area was simulated using the Storm Induced BEAch CHange model, SBEACH (Larson and Kraus, 1989). SBEACH simulates the morphological response of a given input beach profile to varying wave and water level conditions. For purposes of this investigation, SBEACH model parameters were calibrated to the observed equilibration of the CCAS beach following nearshore dredging completed by the U.S. Army Corps of Engineers (USACE) associated with the Canaveral Harbor Federal Sand Bypass Project. Calibrated model parameters were then used to evaluate the cross-shore response of two with-project profiles to the passage of a typical tropical cyclone event. Basic model input includes bathymetric data and time series of wave height, period and water surface elevations.

The model results suggest that a typically severe (10- to 20-year) storm event is not expected to result in erosion of the CCAS uplands under either excavation scenario. The simulated results are similar to that which would normally result in full equilibration of the Corps' sand bypass dredge cut. Further, these model results do not suggest any impacts to the profile (above +2 ft, NGVD) beyond those directly associated with construction of the CCAS project

Model Input. For this study, the SBEACH model was calibrated using measured Sand Bypass II beach profile data along the CCAS project area, collected in June 1998 and September 2000. The former represents immediate post-dredging conditions of the nearshore borrow area. The latter represents 27-month post-dredging conditions that demonstrate the observed equilibration of the profile in response to the April 1998 nearshore dredging for the Bypass II project. Calibrating the profile response to the Corps' Sand Bypass II dredging is germane to this investigation as the Corps' nearshore cut is recurrent and similar in concept to the proposed project.

Composite profiles based upon measured data at transects BC-7, BC-8, and BC-9 were numerically developed for each survey interval. **Figure 2-1** presents the composite profiles computed for model calibration. The recession of the upper berm (+8 ft, NGVD) depicted by the composite profiles (69-feet) is slightly greater than the average recession observed in the discrete

profiles (59-feet). This intentionally provides a more conservative estimate of equilibration impacts, particularly considering the broad range of historic erosional trends. Between the June 1998 and September 2000 surveys the measured recession ranged between 41 and 74 feet at profiles BC-7, BC-8 and BC-9.

In general, the elevation of the upland portion of the profiles decreases as one nears the north jetty at Canaveral Harbor. In order to compare the response of profiles where upland elevations are relatively low, simulations were also completed using survey data from profile CCAFS-30 as model input. The September 2000 survey along profile transect CCAFS-30 is presented as **Figure 2-2**. For reference, the proposed CCAS and CORPS sand bypass project templates are included in the figures.

Analysis of with-project conditions was based upon the proposed CCAS upland cut and the Corps bypass cut, described as follows: The latter is a 1V:5H slope extending downward from the mean high water shoreline (MHW) to -16 feet, mean low water (MLW). MHW is located about 2.0 feet *above* NGVD and MLW is located approximately 1.9 feet *below* NGVD.

The seaward limit of the proposed CCAS project is the existing +2.1 ft, NGVD contour. The excavation limits are bounded by a 1V:100H slope extending landward from this point and intersected by a 1V:10H slope extending seaward from the landward limit of cut, which varies along the project plan view. The proposed action also includes the construction of a dune feature with a seaward toe located approximately 15 to 20 feet behind the landward limit of cut. The anticipated dune is to be constructed with 1V:4H side slopes and a crest width between 3 and 15 feet. Dune crest elevations vary from +8 ft to +13 ft, NGVD along the project reach. For the purposes of modeling, dune crests were modeled as 10 feet in width, at elevations of +13 feet and +11.5 ft, NGVD for composite and CCAFS-30 profiles, respectively. The project configurations for the representative model runs were applied to the September 2000 composite profile and are plotted in **Figure 2-3**.

Based on observed changes in the beach following Bypass I and II construction, it appears that profile equilibration is more dependent upon episodic storms than daily wave action. This observation is particularly true in the upland where overwash of the profile has been well documented. Accordingly, beach profile changes were calibrated and simulated using discrete storm/wave events in lieu of monthly or daily events.

Wave and water level data used as input for model calibration were derived from measured conditions observed during the passage of Hurricane Floyd, in September 1999. Floyd was selected as the basis for synthetic storm development because it was a major hurricane impacting the area following the 1998 construction of Bypass II, and measured data from the storm were available.

The magnitude and duration of the storm's sea surface hydrograph were fundamentally developed from measured water level data at the Trident Pier (NOS Station ID: 8721604). The corresponding time-series of wave height and period were developed from WIS hindcast station 441, with wave height adjusted downward to account for the sheltering/refractive effect of Cape Canaveral Shoals, which limit the wave energy that reaches the project area shoreline. **Figure 2-4** depicts the input wave and water level conditions.

This storm, when applied to the calibrated SBEACH model, generally represents that which resulted in full equilibration of the upland portions of the CCAS shoreline following the

Corps' 1998 excavation for the Bypass II project. This storm is herein referred to as the 'equilibration event', and is nominally equivalent to a 10- to 20- year storm event.

Model Calibration. The SBEACH model was calibrated to the 1998/2000 equilibration of the Corps' sand bypass dredging by setting the transport rate coefficient K = 1.4x10-6 m^4/N and the coefficient for slope-dependent term *Eps* = 0.001 m^2/sec. This produced the best agreement between the measured and predicted post-equilibration profiles along the intertidal beach and upper berm (**Figure 2-5**). Along the intertidal beach and berm, SBEACH typically predicts the post-storm recession of a given elevation contour within three feet of the measured value. SBEACH does not model the measured sand accretion observed below the water line (not pictured). This is the result of alongshore accretion (recovery) in the bypass borrow area that is not the product of cross-shore profile erosion/equilibration.

Results (Model Prediction). **Figures 2-6** and **2-7** present the response of the modeled profiles to the passage of the synthetic storm event. The figures compare the predicted equilibrium of the 9/2000 composite and CCAFS-30 profiles and consider the following project scenarios (1) no cut, (2) CCAS cut only, (3) Corps' sand bypass cut only, and (4) combined (concurrent) CCAS and Corps' cuts. For each with-project alternative, the maximum cut (borrow) profile is presumed. The model predicts no erosion landward of the proposed dune feature will take place following the passage of the 10- to 20-year equilibration event, for any project scenario.

Specifically regarding the CCAS project cut, the seaward slope of the construction template appears to be gentle enough that it essentially represents an equilibrated system. The model routine tends to flatten the overall profile, and does not predict any additional recession of the upland beyond that which is proposed for development. For the CCAFS-30 simulation, the model predicts some dune overwash deposition.

The predicted effect of the Corps' cut (only) is to create an overwash deposit, or new dune, at or slightly landward of the existing dune location. This result is predicted for both profiles considered, and is consistent with observed equilibration trends observed following construction of previous Corps' sand bypass projects (see calibration discussion).

Modeling results for both profiles following the concurrent construction of the proposed CCAS project and the Corps' sand bypassing project are quite similar. The landward toe of the proposed dune feature is predicted to be slightly impacted by the synthetic 10- to 20-year event, but SBEACH does not predict dune breaching in either instance.

Additional simulations were conducted whereby the CCAS cut is made first and equilibrated by a storm, and then the Corps' sand bypass cut is made at the new, adjusted high water line and then equilibrated by a second storm. No profile recovery (accretion) is assumed to occur between the two events. This "two-event" scenario is expected to represent worst case conditions. **Figures 2-8** and 2-**9** depict the predicted results sing the 'typical' 10- to 20-year storm equilibration, for both composite and CCAFS-30 profiles. The back-to-back project cuts and subsequent equilibrations do not compromise the integrity of the proposed dune at the landward edge of the cut. The overall predicted effect is not significantly different than the single storm event predictions – in which both projects were cut and equilibrated concurrently.

Also considered was a single low-frequency storm event, equivalent in magnitude to a 100-year tropical cyclone. The hydrograph of this storm was based storm tide elevations predicted by Dean and Chiu (1986). Model results suggest that passage of an event of this

magnitude will result in the complete inundation of both the existing *and* post-construction profiles (i.e. storm waters flood the upland profile along the entire model grid). The SBEACH model is not equipped to give reliable results under these conditions; as such, there is little discernable difference between with- and without-project, post-storm profiles. For this reason, results for the 100-year storm simulations are not presented herein.

Summary. The cross-shore storm response model SBEACH was calibrated in order to predict the observed equilibration of the CCAS shoreline following the 1998 construction of the Corps' Sand Bypass II project. The calibrated model was then used to simulate the equilibration of the September 2000 composite profile following construction of three project scenarios: (1) no-project, existing shoreline only, (2) construction of a typical CCAS project cut, (3) construction of the authorized Corps' sand bypassing but, and (4) simultaneous excavation of the proposed CCAS borrow area and the Corps' authorized sand bypass cut.

The model results suggest that a typically severe (10- to 20-year) storm event is not expected to result in erosion of the CCAS uplands under either excavation scenario. This event is similar to that which would normally result in full equilibration of the Corps' sand bypass dredge cut (10.7 ft maximum breaking wave height and 9.4 ft, NGVD maximum water surface elevation plus setup). Further, these model results do not suggest any impacts to the profile (above +2 ft, NGVD) beyond those directly associated with construction of the CCAS project.

References

Dean, R.G. and T.Y. Chiu, 1986. *Brevard County Storm Surge Model Study*. Florida Department of natural Resources, Division of Beaches and Shores. Tallahassee, Florida.

Larson, M. and Kraus, N. C., (1989). "SBEACH: Numerical Model for Simulating Storm-Induced Change," 2 Vols., Technical Report CERC-89-9, USACE, Vicksburg, MS.

Figures Follow:

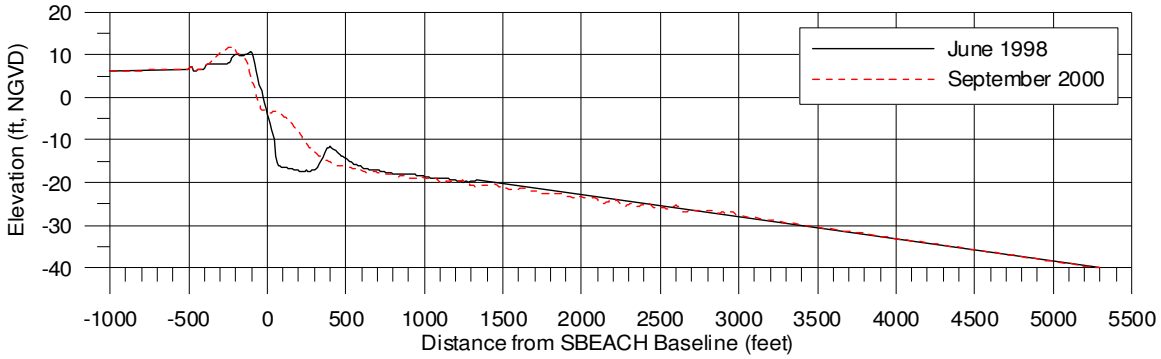

Figure 2-1: Composite profiles used as input to the SBEACH model for calibration.

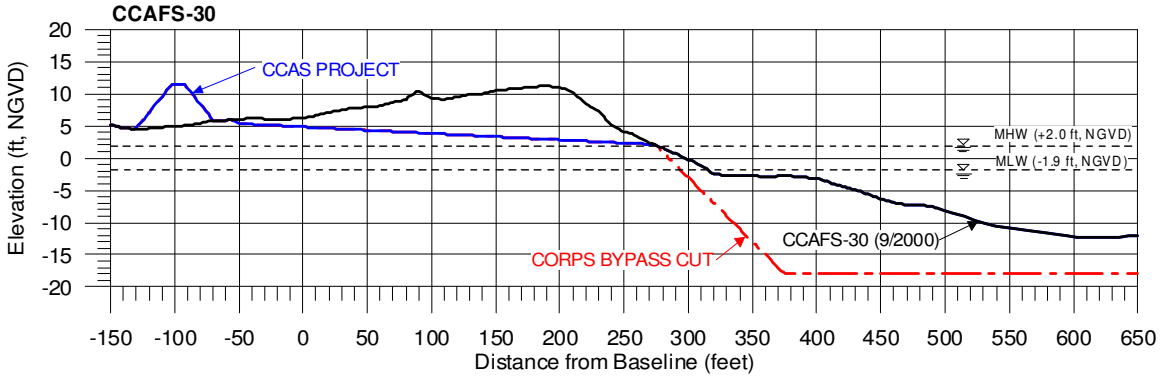

Figure 2-2: September 2000 survey along profile CCAFS-30, including simulated excavation alternatives.

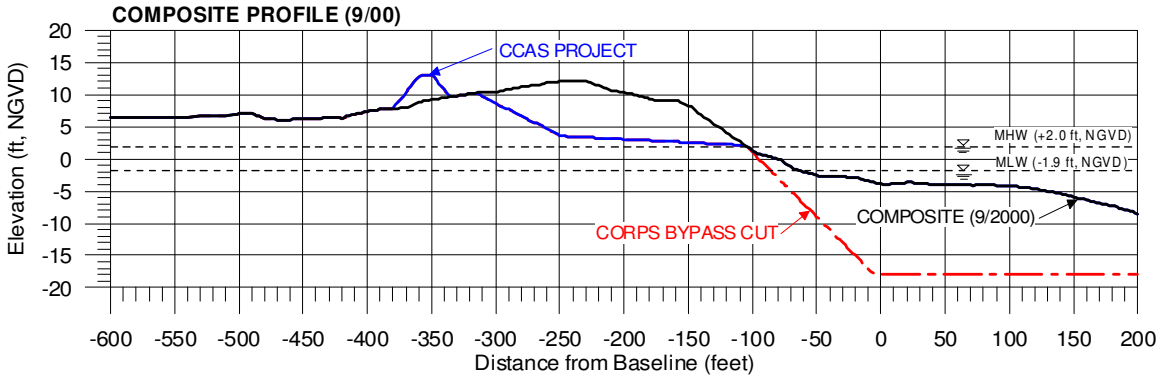

Figure 2-3: September 2000 survey along composite of profiles BC-7, BC-8, and BC-9 including simulated excavation alternatives.

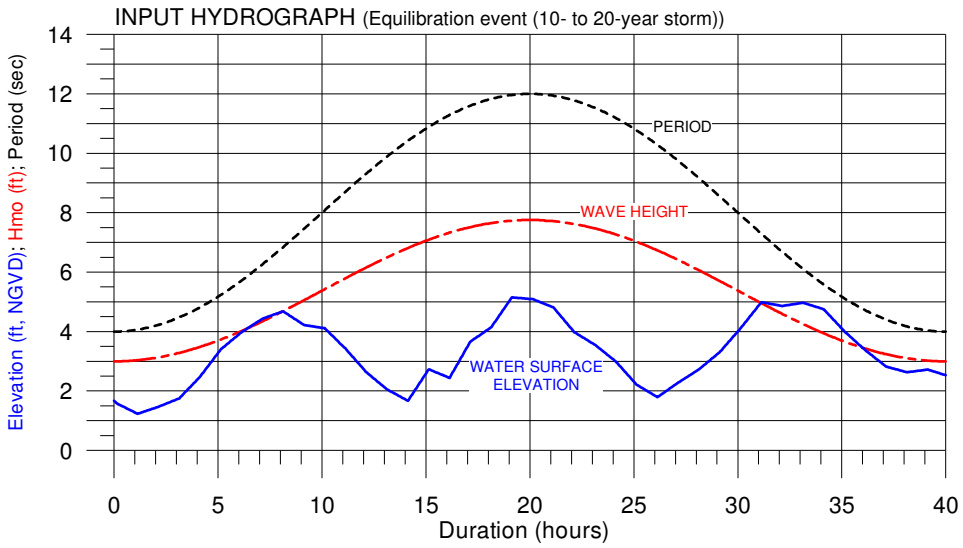

Figure 2-4: Input hydrograph used to calibrate SBEACH to the observed equilibration of the CCAS shoreline following the Corps' Bypass II cut and representing a typical 10- to 20- year return period event.

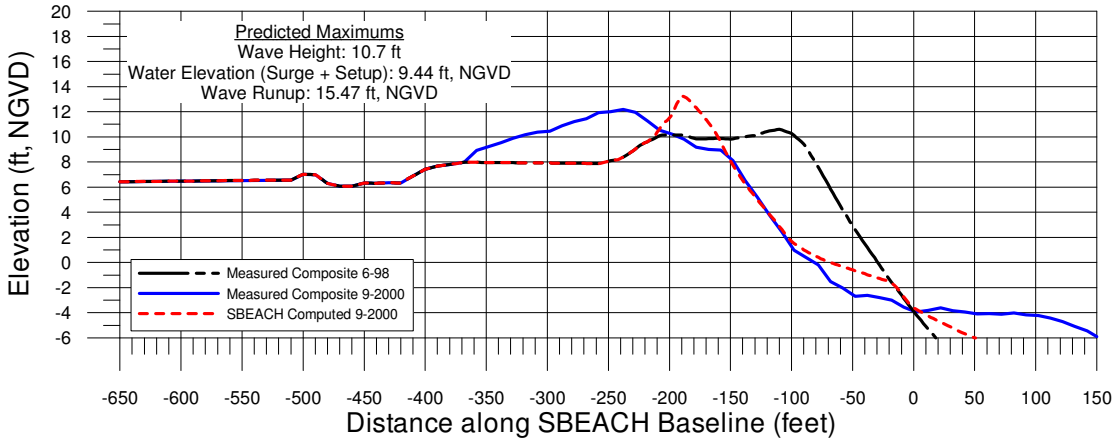

Figure 2-5: Calibration of the SBEACH model.

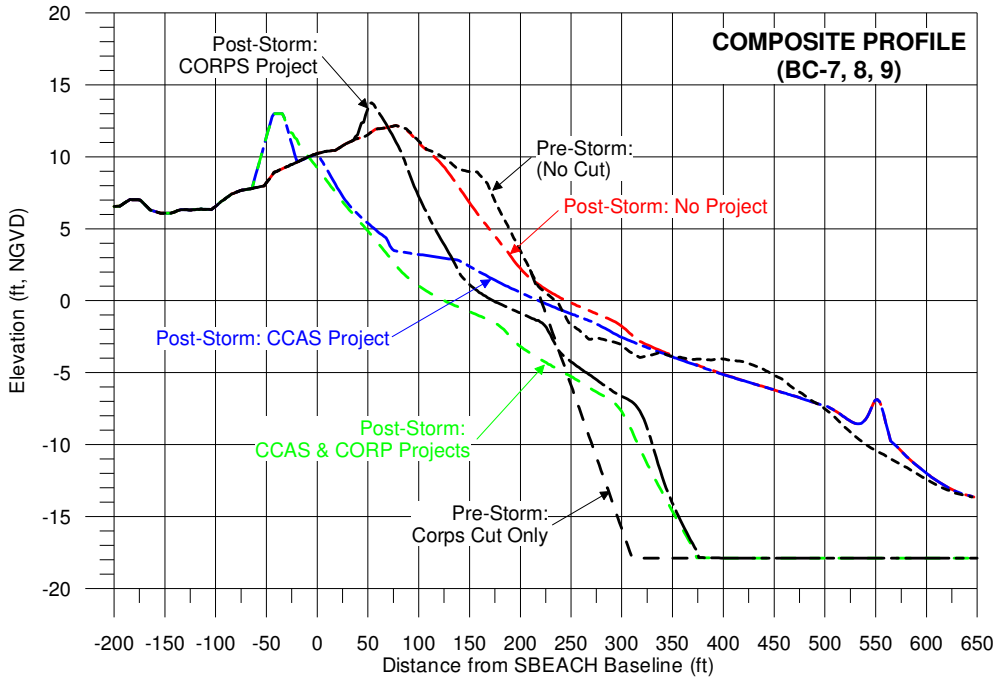

Figure 2-6: Model results detailing the predicted effect of the synthetic 10- to 20-year equilibration event on the 9/2000 composite profile for various project alternatives. [No cut (red), CCAS cut only (blue), Corps cut only (black), combined CCAS-Corps cut (green)]

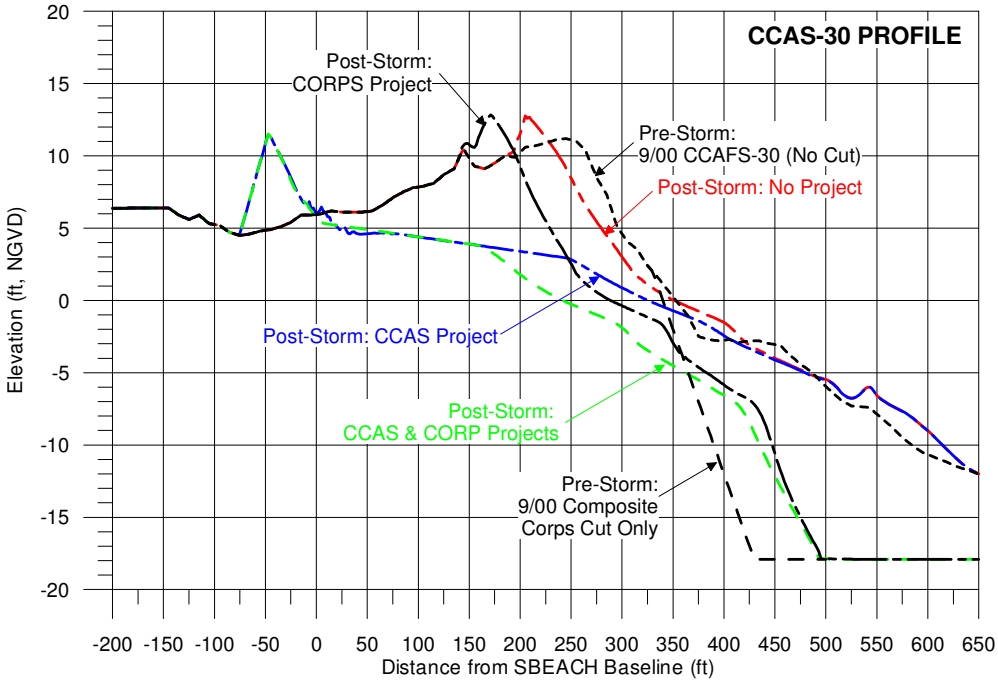

Figure 2-7: Model results detailing the predicted effect of the synthetic 10- to 20-year equilibration event on the CCAFS-30 profile (9/2000) for various project alternatives. [No cut (red), CCAS cut only (blue), Corps cut only (black), combined CCAS-Corps cut (green)]

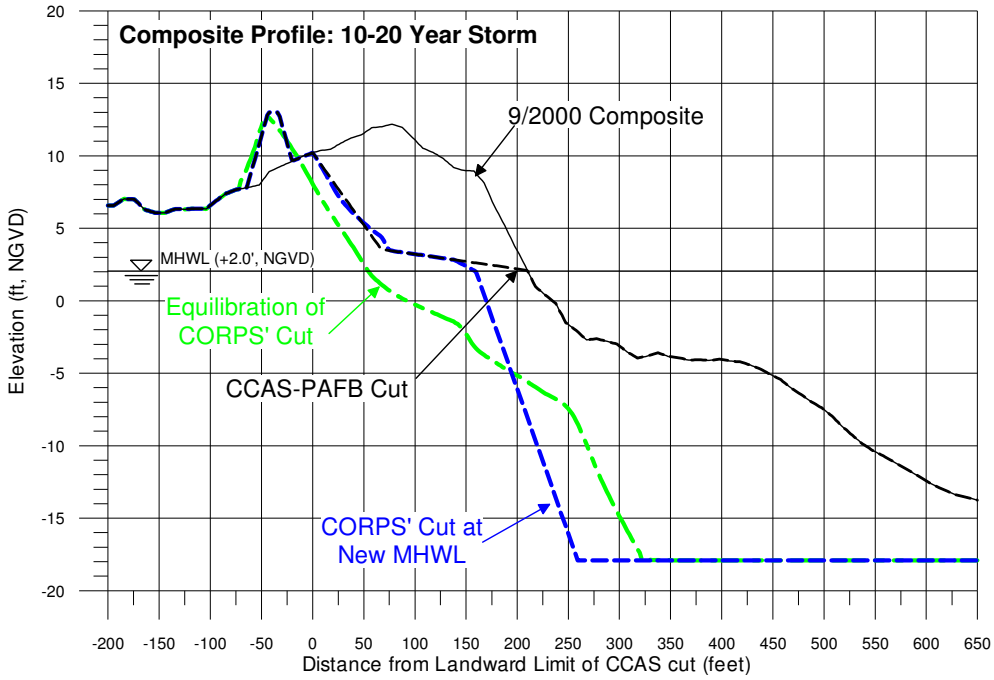

Figure 2-8: Model results detailing the predicted effect of two consecutive synthetic 10- to 20-year equilibration events on the composite profile (9/2000) for various project alternatives. [CCAS cut first, then equilibrates, then Corps' bypass project is cut and equilibrates.]

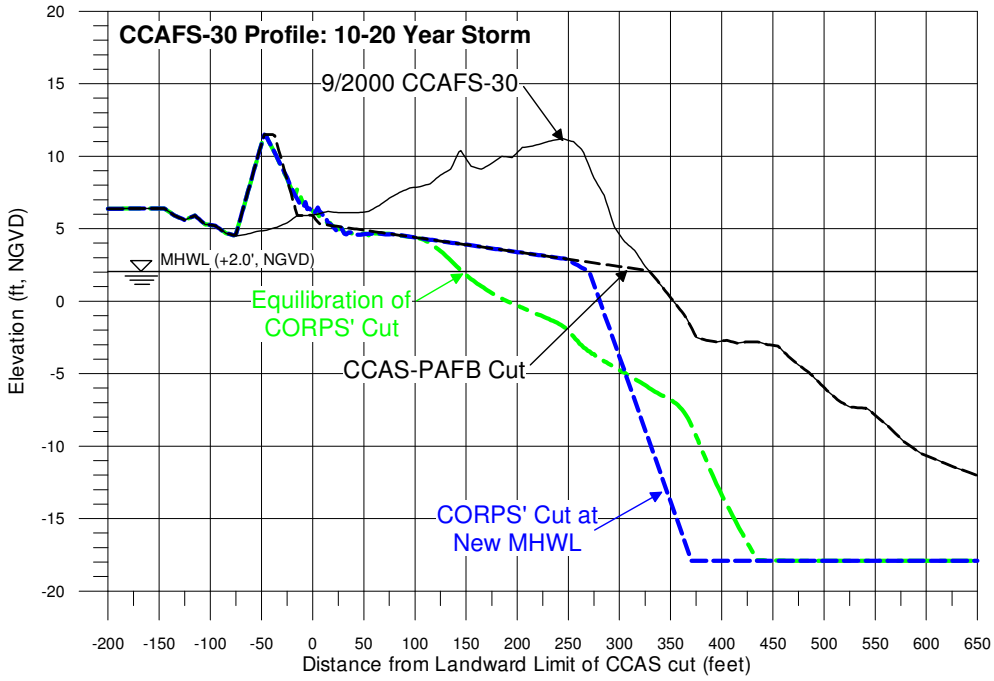

Figure 2-9: Model results detailing the predicted effect of two consecutive synthetic 10- to 20-year equilibration events on the CCAFS-30 profile (9/2000) for various project alternatives. [CCAS cut first, then equilibrates, then Corps' bypass project is cut and equilibrates.]

APPENDIX 3

GOPHER TORTOISE CONSERVATION PLAN AND RELOCATION PERMIT

CCAFS Gopher Tortoise Conservation Plan
January 2004

Introduction

Cape Canaveral Air Force Station (CCAFS) compromises about 15,800 acres of a barrier island located along the central east coast of Florida (see CCAFS Gopher Tortoise Plan, 1999). The space program at CCAFS continues to experience fast-paced growth due to new Department of Defense launch programs and increased commercial launch activities. Assessing the potential impacts from this development in 1998 revealed several areas of environmental concern for the 45th Space Wing (45 SW) of the U.S. Air Force. The 45 SW must determine potential impacts from these proposed projects on several species including the gopher tortoise (*Gopherus polyphemus*). Gopher tortoises that are determined to be potentially impacted are avoided and relocated to offset adverse effects to the species. Although the gopher tortoise is not a federally protected species, it is afforded protection by the 45 SW due to its State ranking (Species of Special Concern), and the commensal relationship with other federally protected species (i.e. indigo snake).

The Air Force's commitment to good stewardship of the environment has culminated with a solid working relationship between the 45SW and the FWCC. This relationship has enabled the 45 SW and the FWCC to develop a consensus regarding the best way to proceed with gopher tortoise relocation issues. A meeting to discuss management options and future plans for gopher tortoises was held at CCAFS in February 1999 and included 45 CES/CEV and FWCC. This conservation plan, which establishes guidelines for the blanket gopher tortoise relocation permit on CCAFS, is the result of that meeting.

Background

Relocation requirements come up frequently on CCAFS due to what appears to be a very substantial gopher tortoise population. In 1999, meetings were conducted with the CCAFS community planner, real property custodian and master planning offices in an effort to establish an estimate of acres of gopher tortoise habitat that could be impacted by future development. Unfortunately, a viable acreage projection could not be determined, since siting is often dictated based on potential environmental impacts, such as presence of tortoises. At that time, approximately 40 acres of previously undisturbed land had been impacted by development in the previous five years. In 2000, approximately 15 acres were developed. A one-year blanket relocation permit for gopher tortoises was issued to assist the 45 SW in responding to short-notice actions. The issuance of the 2000 permit for CCAFS expedited at least seven projects that would have impacted FWCC permit workload and delayed actions on CCAFS in as many times.

Methods

The following are the current procedures utilized on CCAFS for gopher tortoise relocation issues.

Site Determination

No single or centralized site will be used for all tortoise relocations on CCAFS. Permits previously issued by the Florida Game and Fresh Water Fish Commission (FGFWFC) referred to on-site and off-site relocations. For the sake of simplicity, all land within CCAFS boundaries would be considered on-site. Donor sites (areas in which habitat suitability could be affected) will be surveyed to determine the number of gopher tortoises occupying the site and the number of individuals that would require relocation. Additionally, a recipient site will be chosen and surveyed to determine the presence/absence of tortoises occupying that site. If the proposed recipient site already contains a dense population of tortoises, an alternate site will be selected. Whenever possible, a number of tortoises removed from a single site will be treated as a "group or neighborhood" and would be relocated to a common recipient site.

Based on gross estimates from Geographical Information System (GIS) data, approximately 11,650 acres of potentially suitable gopher tortoise habitat exists on CCAFS, as of June 1999. The following describes, in order of preference, how recipient sites will be chosen:

Choice 1: Tortoises will be relocated as close to the donor site as possible (i.e. distances ranging from 10 m to 1 km). If the proposed development/action is small, tortoises can be kept on the general site, but away from the construction. For example, a minor construction activity at a launch complex may require that tortoises be moved from a specific site, without actually removing them from the overall burrowing and foraging area within the perimeter of the complex. Included in this category is temporary holding and release at the original site. This would be in support of short-term work in a particular area, like repairing underground utilities, etc. Tortoises may be held for a day and released to their original location.

Choice 2: If a nearby relocation is not possible, tortoises will be moved to a more distant site, still located on CCAFS, in which suitable, safe habitat exists. In general, primary recipient sites would be in scrub habitat enhancement sites, blast danger areas (BDA), or launch danger areas (LDA)(refer to habitat map). The preferred relocation area would be a BDA. This is an area surrounding an active launch complex, or other explosive operation, where no new construction is allowed due to Air Force safety regulations. An area such as this would ensure a very low potential of secondary relocations. Launch Danger Areas and BDA's make up approximately 6,896 acres of habitat that are least likely to be developed or otherwise result in impacts to gopher tortoises.

Choice 3: If a safe habitat (no anticipated clearing in the future) within a BDA, LDA or scrub habitat enhancement site cannot be found, tortoises would be relocated to other suitable habitat on CCAFS. In this situation, there would be no guarantee that the recipient site would remain undeveloped, thus opening up the possibility of secondary relocations. Although it is not anticipated that this choice will be required, it is being identified as the method of last resort.

Animal Capture and Handling

If the observer cannot confirm whether a burrow is active or is not confident in a determination, the burrow will be assumed active. The presence of tortoises may be confirmed using a gopher tortoise burrow camera, however, confirmation employing this method is not always possible. Typically, gopher tortoises slated for relocation will be captured using the bucket trap method. If tortoises must be removed quickly, or evade bucket traps, a backhoe will be used to excavate the burrow. Only experienced backhoe operators will be used for this activity, with trained tortoise observers providing oversight throughout the entire operation.
Since gopher tortoises are susceptible to cold stress, temperatures will be considered during all non-summer relocations. Tortoises will be captured and/or relocated only on days when the overnight low temperature is forecast to be above 50 degrees F, and the two consecutive overnight lows are also forecast to exceed 50 degrees F.

Tortoises will be measured and permanently marked using the scute drilling method. Since a unique numbering system already exists on CCAFS and the adjacent Kennedy Space Center, the 45SW will continue to utilize the existing system. If the appropriate level of funding can be provided by the activity requiring tortoise relocation, blood samples will be taken for analysis for Upper Respiratory Tract Disease (URTD). (In 2000, 31 samples were collected.) Samples will be drawn from the brachial vein of a restrained tortoise using 25 gauge needles and monoject syringes. Blood will be immediately transferred via pipette to lithium heparin separator tubes for preservation. Samples will be kept cold and then centrifuged, for plasma separation. Samples will be frozen at minus 20 degrees C until shipment to the University of Florida for analysis. To ensure risk reduction for cross contamination and spread of disease, including URTD, individual tortoises will be kept separate during holding and processing periods. All processing equipment will be cleaned with a 10% bleach solution between uses and tortoises will be held in clean, separate containers.

Data Dissemination

All information relating to the tortoise relocation will be entered into a GIS database, and a short summary will be completed describing the relocation activity (donor and recipient site description, date, turtle ID, morphometrics, sex, general health, etc.). These reports will be kept on file in the CCAFS 45 CES/CEVP office. This information (GIS) can be provided to FWCC, if requested. In accordance with current permit provisions, a report detailing the capture/relocation effort will be forwarded to the FWCC, using the standard report form provided by that office.

In addition, the 45 SW has initiated a program to compile and maintain historical tortoise relocation data, which includes use of GIS to analyze and display this data for future planning. A public awareness program has been initiated on CCAFS to encourage individuals to report sightings of marked tortoises. These opportunistic sightings, along with project related tracking, continue to be documented in the GIS database.

Permit

The current permit holder's name is Mr. Clay Gordin, Chief of Conservation and Planning for the 45th Space Wing. Strict oversight of the permit use will be conducted for Mr. Gordin by biologists familiar with gopher tortoise biology and relocation procedures. The estimated number of tortoises to be moved annually should not exceed 150 individuals. Additional permit requirements established by FWCC will be strictly adhered to and the FWCC permitting office will be contacted immediately should any questions or problems arise.

PERMIT

Issued Under Authority of the Wildlife Code of the State of Florida (Title 68A, Florida Administrative Code) by the

STATE OF FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

Division of Wildlife, 620 South Meridian Street, Mail Station WLD-BLX, Tallahassee, FL 32399-1600, (850) 921-5990, ext. 17310

Permit No. WR04151 **Issuance Date** 5 May 2004 **Expiration Date**31 December 2007

Permit Type Tortoise Relocation **Specific Rule Authority** 68A-9.002, 68A-25.002 & 68A-27.005

Permittee	Clay Gordin	**Developer**	same as permittee
Affiliation	Department of Air Force	**Company**	
Address	1224 Jupiter Street, MS-9125	**Address**	
	Patrick AFB, FL 32925-3343		
Phone No.	(321) 853-6578	**Phone No.**	( )

Signature _____ **Date** 18 May 04

Not valid until signed

Certification: I hereby state and confirm by signature that I have received, read, understand, and agree to abide by all regulations, guidelines, and provisions regarding the issuance of this permit, and I further certify that the information submitted in this application and supporting documents is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to criminal penalties. I further state that I will abide by all applicable State, Federal, and local laws. Please return a signed copy to this office.

The above named Permittee is authorized to capture, remove and relocate gopher tortoises (*Gopherus polyphemus*) in Florida pursuant to Rules 68A-9.002, 68A-25.002 and 68A-27.005, F.A.C., the Florida Fish and Wildlife Conservation Commission's Gopher Tortoise Relocation Guidelines dated August 13, 2001 and subject to the following provisions/conditions.

Provisions/Conditions:

1. Up to 150 gopher tortoises (*Gopherus polyphemus*) may be live-captured by nonharmful means, to be relocated to and released within the boundaries of Cape Canaveral Air Station (CCAS), Brevard County, except that (a) such tortoises may be captured/relocated only as absolutely necessary to avoid harm due to construction activities, (b) tortoises are to be captured/relocated immediately prior to initiation of ground breaking work, (c) releases must be made according to choices 1 and 2, as identified in the February 2004, application herein incorporated by reference, and (d) the permittee must seek separate authorization from the Commission to execute choice 3. Any gopher tortoise burrow commensals encountered in the capture operation may likewise be live-captured, relocated and released. However, no more than one indigo snake *(Drymarchon corais couperi)*, or 10 each of Florida mice *(Podomys floridanus)* and gopher frogs *(Rana capito)* may be relocated. Should additional specimens of those listed species be encountered, the capture operation is to be suspended and this office contacted for instructions.

2. Tortoises shall not be captured/relocated on days for which the overnight low temperature for that day and the two consecutive days thereafter is forecasted by the U.S. National Weather Service to be below 50°F. This 3-day window of milder overnight temperatures is to allow the relocated tortoises to settle into the recipient site. Authorizing the capture/relocation is otherwise predicated and conditioned on the information and assurances provided in the Permittee's February 18, 2004 (and April 2, 2004 supplemental) application, the assurances of which are herein incorporated by reference.

PERMIT

Permit no. WR04151

Provisions/Conditions: Continued

3. Gopher tortoises (*Gopherus polyphemus*) may be captured upon encounter or by bucket traps, only, in association with proposed development projects at the 45th Space Wing, Cape Canaveral, Florida, and held for the collection of blood samples for determining exposure to the mycoplasma for Upper Respiratory Tracy Disease (URTD).

4. Captured specimens may be held for up to 24 hours, then released unharmed at their points of capture. Bucket trapping must be performed in a manner that is consistent with approved wildlife methodologies, so as to avoid damaging the tortoise burrow. Any gopher tortoise burrow commensals encountered in the capture operation must be released immediately. Any mortality associated with this work must be reported to the Protected Species Permit Coordinator in writing or by fax at (850) 921-1847 within 48 hours.

5. The Permittee must notify the Commission's Protected Species Permit Coordinator in writing prior to each instance of exercising this permit. Said notice shall state a) applicant's name, affiliation and permit number), b) project name, c) the source location (County and Township, Range and Section) and d) estimated number of tortoises to be sampled (form enclosed for use and photocopying as needed). The Permittee shall update this information in writing within 48 hours as circumstances change.

6. Blood samples for testing (identified with the applicant's name, project name and County) shall be submitted by the Permittee to:Mycoplasma Testing Lab, University of Florida, Department of Pathobiology, 1600 SW Archer Road, BSB 350, Gainesville, Florida 32610, (352) 392-4700, extension 3968, per the enclosed blood testing protocol. The Permittee is responsible for all fees and costs associated with testing. Test results will be provided by the testing facility to the Commission and the applicant.

7. This permit does not authorize Permittee access to any public or private properties. Any required permission accordingly must be secured from the appropriate landholders prior to undertaking any work on such properties.

8. Captured/relocations may be undertaken only subsequent to all other permits for the project which may be required by local, state and/or federal agencies being issued. This permit is subject to revocation at any time pursuant to Chapter 120, Florida Statutes. It is nontransferable and must be readily available for inspection at all times while engaging in the permitted activities. Other qualified personnel mayassist in the permitted activities, but when any such assistance is to be provided in the absence of the permittee's direct supervision, those assistants are to be designated by letter of authorization from the permittee to each designee, with this office provided a copy of such letter(s).

9. The Permittee shall notify the Protected Species Permit Coordinator by fax at (850) 921-1847 or by phone at (850) 921-5990 within 24 hours of initiating the tortoise relocation effort.

PERMIT

Permit no. WR04151

Provisions/Conditions: Continued

10. The Permittee, by signing this permit, specifically agrees to allow authorized Commission personnel, upon presentation of credentials as may be required by law, access to the donor and recipient sites, at reasonable times, for the purpose of inspecting the capture/relocation

11. The Permittee shall submit a report detailing **each** capture/relocation effort to the Commission's regional contact person, with copies provided to the recipient site landowner and this office, within 30 days of release of the captured/relocated tortoises involved. Report form areattached for use in that regard. Any request for permit renewal or extension shall be submitted at least 30 days prior to the expiration date of this permit.

Kenneth D. Haddad
Executive Director

By: Thomas H. Eason
Thomas H. Eason, Ph.D., Chief
Bureau of Wildlife Diversity Conservation
Division of Wildlife

W1067/THE/jb
LIC 6-20
WR04151.per
Attachments

cc: OES Director
Northeast Region

APPENDIX 4

AGENCY CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

IN REPLY REFER TO:

41910-2006-F-0707

July 20, 2006

Brigadier General Susan J. Helms
1201 Edward H. White II Street,
Patrick AFB, Florida 32925

FWS Log No: 41910-2006-F-0707

Dear Brigadier Helms:

Based on further review and discussions, the U.S. Fish and Wildlife Service (Service) is modifying our October 19, 2005 biological opinion (05-1125) on the proposed utilization of 3,600 linear feet of beach and dune habitat within Cape Canaveral Air Force Station (CCAFS), as a borrow source for sand to protect ocean shoreline within Patrick Air Force Base (PAFB) in Brevard County, Florida. The modification addresses the project's anticipated incidental take of southeastern beach mice (*Peromyscus polionotus niveiventris*).

The proposed borrow site is located immediately north of the Canaveral Harbor Inlet. The proposal is to excavate sand across the beach face into contiguous upland, and haul the material by truck for placement on the shoreline of PAFB. The proposal also includes constructing a new dune at the borrow site with a seaward toe located approximately 15 to 20 feet behind the landward limit of the cut. The dune will have 25% side slopes, a crest width between 3 and 15 feet, elevation between 8 to 13 feet, and be 5 feet high and 2 to 3 cy/ft along the shore. Material used in dune construction will come from the upper 6 to 12 inches of material initially removed from the borrow area, which consists of vegetation, roots, or other organics. Additional plantings of sea oats and other native dune vegetation are expected to recreate beach mouse habitat along the primary and secondary dune.

The Service has re-written the "Reasonable and Prudent Measures" and "Terms and Conditions" provided in the biological opinion in order to further minimize direct take of southeastern beach mice. Please replace those sections with the following changes. All other parts of the original biological opinion (05-1125) will remain the same.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to provide those reasonable and prudent measures it considers necessary and appropriate to minimize that take, and the terms and conditions needed to implement the reasonable and prudent measures. Furthermore, the Service also must specify the procedures used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measures are necessary and appropriate to reduce take:

1. The transportation, operation, and staging of vehicles, equipment, and other project-related materials and supplies shall be conducted in a manner that avoids death or injury of southeastern beach mice either directly or through destruction of burrows, within contiguous, unexcavated habitat.

2. Prior to hurricane season (June 1), once every two years, trap mice within the action area and translocate them to suitable habitat within the Archie Carr National Wildlife Refuge (ACNWR). The trapping event will depend on suitable beach mouse habitat within the action area. These two-year trapping events will not occur if the Service has determined that there is not sufficient suitable habitat for beach mice.

3. In-between the two-year trapping event and prior to any excavation, trap mice in the area of direct impact for two nights and relocate them to suitable habitat at least 1000 feet from direct impact area on CCAFS.

4. Rebuild the dune and vegetate using native plants. For subsequent excavations avoid this rebuilt dune area. The rebuilt dune will be assessed to determine if further excavations will impact the new dune in ten years. The Service will determine at that point if further two-year trapping and relocation events will be necessary.

5. Determine the survivability of translocated mice at CCAFS.

6. Notify the Service of any unauthorized take of southeastern beach mice.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

1. The Air Force will follow the trapping protocol (copy attached) prepared by the Service. Point 6 of the trapping protocol is modified as follows: "Trapping shall be done for five (5) consecutive nights once every two years". The trapping event that occurs every two years will be conducted by representatives of the Air Force's 45th Space Wing (SW), the Service, and the Florida Fish and Wildlife Conservation Commission (FWC). The

relocation to the ACNWR and the monitoring at ACNWR will be done by FWC and the ACNWR.

2. The captured mice will be relocated using a "soft release" technique. The mice will be reintroduced on suitable habitat within the Archie Carr National Wildlife Refuge, where mice are currently extirpated. All mice trapped during the two-year event will be relocated to ACNWR unless otherwise determined by the Service.

3. In-between the two-year trapping event, prior to excavation, the area should be assessed for storm damage of beach mouse habitat. Representatives of the 45th SW will contact the Service via email including a description of the habitat and photographs depicting the habitat. If the area to be excavated has beach mouse habitat, beach mice will be trapped in that immediate area of excavation for two nights and relocated on CCAFS. Suitable areas of relocation will be determined prior to trapping. The areas will be determined by the availability of suitable habitat and the most recent beach mice surveys in that area.

4. Rebuild the dune and vegetate using native plants, including sea oats, in accordance with currently established standards and protocols for dune vegetation restoration. The required dune photographs (see # 3 above) shall be used as references for the pre-excavation condition of the dune plant community. A dune vegetation restoration plan shall be submitted to the Service for review and approval prior to initial excavation. That plan shall include, but not be limited to, a purpose, goals, objectives, strategies, and implementing actions. The plan in general shall describe materials and methods, success criteria, and monitoring. Regarding subsequent excavations, in order to protect the rebuilt dune from such excavations and associated activities, the project plans and specifications will include a requirement for a 10-foot, no action buffer between any rebuilt dune segment and contiguous area of excavation. The rebuilt dune will be assessed in ten years to determine if further excavations will impact the new dune. The Service will determine at that point if further two-year event trapping and relocation will be necessary.

5. The Air Force shall determine the survivability of the mice translocated to grids on CCAFS by tagging relocated mice and conducting a second trapping one month following relocation. The trapping event will follow the Service's three day trapping protocol. The Air Force shall report Presence or absence of relocated mice to the Service within two weeks following completion of the trapping.

6. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904)232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service has determined that all the southeastern beach mice utilizing areas

of dune access for the excavation project along the 3600 linear feet of shoreline will be incidentally taken. If, during the course of the action, this level of incidental take (3600 linear feet) is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. For further coordination please contact Ann Marie Lauritsen at (904) 232-2580 ext. 111 of this office.

Sincerely,

David L. Hankla
Field Supervisor

Cc:
Annie Dziergowski- Jacksonville Field Office
Paul Tritaik- Archie Carr National Wildlife Refuge

TRAPPING PROTOCOL FOR BEACH MICE

1. Individuals conducting the trapping must have previous experience in live trapping, handling, and identification of small mammals.

2. Surveys must include the entire dune system within the project area and, if permission can be obtained, adjacent lands with beach mouse habitat. Trapping areas must include all suitable habitat types such as: frontal dunes, secondary dunes, scrub dunes, and dry flats behind dune systems, regardless of distance from the beach.

3. Trapping must be conducted along linear transects with live-traps spaced at 32.8 feet (10 to 15 meter) intervals. Linear transects should be parallel to the frontal dune system, and at least one transect should be placed in each habitat type.

4. Transects must extend the full length of each habitat type except where long blocks of habitat are involved ($\geq$ 2,640 feet/750 meters). In those cases, the habitat may be covered by several non-contiguous transects.

5. Two traps per trapping station are desirable, but one trap per station is acceptable.

6. Traps must be operated for five nights per trapping season or until a beach mouse is caught. At least three nights of trapping should be consecutive.

7. Traps must be checked and all mice released between 12 a.m. and thirty minutes after official sunrise time. All traps should be closed after checking and reset late each afternoon to preclude mortality of mice and other small mammals during the day.

8. When nighttime temperatures are forecast to be <15°C (60°F), a ball of cotton batting (or similar synthetic material) must be placed in each trap for insulation purposes. Trapping should not be conducted when nighttime temperatures are forecast to be <10°C (50°F), without prior coordination from the permitting agencies.

9. Trapping must not be conducted when the moon phase is three-quarters to full, if feasible.

10. Bait must consist of either long-cooking rolled oats, sunflower seeds or safflower seeds.

11. Each trap must be visually inspected before closing to assure no small mammals or other animals are inadvertently left in the trap.
12. Captured mice must be gently released on the ground near protective vegetation immediately adjacent to the trapping station.

13. Any exotic species captured during beach mouse trapping must be euthanized humanely.

14. Presence of beach mice can be documented in a single trapping period, but to determine absence with any degree of certainty will require multiple trapping periods. In that respect, trapping must be conducted seasonally (fall, winter, spring, summer) and in all dune habitats for at least two consecutive years or until mice are caught.

15. All traps must be individually numbered and labeled with identification of ownership.

16. Site description and trapping data must be recorded. The site description must include project location, habitat on the project area and adjacent lands, and trapping design relative to habitat distribution. Daily trapping data must include number of beach mice captured per day, non-target species captured, weather conditions, lost or missing traps, and moon phase. If population data is being collected, sex, age, and reproductive status of beach mice must also be reported. All information must be submitted to the following offices:

Protected Species Permit Coordinator
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street, Mail Station WLD-BLX
Tallahassee, Florida 32399-1600
(850) 921-5990
Fax (850) 921-1847

Terry J. Doonan
Regional Biologist
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
3377 East U.S. Highway 90
Lake City, FL 32055

Deputy Field Supervisor
U.S. Fish and Wildlife Service
6620 Southpoint Drive South, Suite 310
Jacksonville, FL 32216
(904) 232-2580
Fax (904) 232-2404

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

IN REPLY REFER TO:

FWS/R4/ES-JAFL/05-1125-MSBO

October 19, 2005

Colonel Mark H. Owen
Commander, 45th Space Wing, 45 CES/CEVP
1224 Jupiter Street, MS-9125
Patrick AFB, Florida 32925

FWS Log No: 05-1125

Dear Colonel Owen:

This document is the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed designation of 3,600 linear feet immediately north of the Canaveral Harbor Inlet as an upland borrow source for shore protection along the Patrick Air Force Base (PAFB) ocean shoreline, on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the southeastern beach mouse (*Peromyscus polionotus niveiventris*), the eastern indigo snake (*Drymarchon corais couperi*), the loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), and the leatherback turtle (*Dermochelys coriacea*) per section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your request for formal consultation was received on January 27, 2005.

This biological opinion is based on information provided in the January 11, 2005 draft programmatic Environmental Assessment, telephone conversation of February 23, 2005 with Angy Chambers, a site visit on May 27, 2005, and other sources of information. A complete administrative record is on file at the Ecological Service Office in Jacksonville, Florida.

Consultation History

On January 27, 2005, representatives of the 45th Space Wing sent the Service a letter requesting formal consultation on the proposed project.

On February 23, 2005, the Service telephoned the representatives of the 45th Space Wing to discuss the effects of the project. It was determined that the project "may affect" the southeastern beach mouse, loggerhead, green, and leatherback sea turtles.

On May 27, 2005, the Service met with representatives of the 45th Space Wing on site to discuss possible minimization measures. The Service requested a beach mouse transect be conducted to determine the density of mice within the action area. It was determined that the project "may affect" the southeastern beach mouse, and "may affect but not likely to adversely affect" the eastern indigo snake, loggerhead, green, and leatherback sea turtle provided measures are included in the project to avoid and minimize potential take of the indigo snake, loggerhead, green, and leatherback sea turtles.

On June 15, 2005, the Service received an email from representatives of the 45th Space Wing requesting information to the type of survey needed.

On September 22, 2005, the Service received an email with the report of the beach mouse survey report attached.

On September 27, 2005, the Service met with representatives of the 45th Space Wing to discuss relocation efforts for this project.

On September 29, 2005, the Service had all the necessary information to complete a Biological Opinion.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The 45th Space Wing proposes to designate approximately 3,600 linear feet immediately north of the Canaveral Harbor Inlet as an upland borrow source for purposes of shore protection along the PAFB ocean shoreline. The sand from the upland borrow source will be excavated across the beach face into the upland, and truck-hauled to be placed on the shoreline of PAFB. A new dune will be constructed with a seaward toe located approximately 15 to 20 feet behind the landward limit of cut. The dune will be constructed with 25% side slopes and a crest width between 3 and 15 feet, and with elevation between 8 to 13 feet. The dune will be 5 feet high and 2 to 3 cy/ft alongshore. The dune feature will be constructed from the upper 6 to 12 inches of material initially removed from the borrow area, which consists of vegetation, roots, or other organics. The dune will be vegetated with native plants such as sea oats to recreate beach mouse habitat along the primary and secondary dune.

The proposed project will only remove the dune system one time. A primary and secondary dune will be created and vegetated following removal of existing dune. After the creation of the new dune it will remain intact permanently and no further impacts will be done to the beach mouse habitat, subsequent projects will only excavate excess sand from the beach face that has been accreted due to the presence of the jetty and its recent extension. For subsequent excavation events, the Air Force will trap in areas of suitable habitat, and relocate mice to areas designated by the Service.

Prior to the proposed excavation, a shore bird survey will be conducted to ensure that the piping plover is not present within the action area. The Service has described the action area to include 3,600 linear feet of beach and dune immediately north of the Canaveral Harbor Inlet for reasons that will be explained and discussed in the "EFFECTS OF THE ACTION" section of this consultation. The following are measures to minimize the effects on the eastern indigo snake, this is just a protection measure and does not authorize for take or relocation of eastern indigo snakes.

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE

1. An eastern indigo snake protection/education plan shall be developed by the applicant or requestor for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel

before any clearing activities occur). Informational signs should be posted throughout the construction site and in area easily observed by future homeowners and contain the following information:

a. a description of the eastern indigo snake, its habits, and protection under Federal Law;

b. instructions not to injure, harm, harass or kill this species;

c. directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,

d. telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, then frozen.

2. Only an individual who has been either authorized by a section 10(a)(1)(A) permit issued by the Service, or designated as an agent of the State of Florida by the Florida Fish and Wildlife Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the appropriate Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted whether or not eastern indigo snakes are observed. The report should contain the following information:

a. any sightings of eastern indigo snakes;

b. summaries of any relocated snakes if relocation was approved for the project (*e.g.*, locations of where and when they were found and relocated);

c. other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.

The utilization of the borrow source will be completed by March 1. The applicant has agreed to the following measures to avoid "take" of the loggerhead, green, and leatherback sea turtles.

The Service has determined the following minimization measures are necessary and appropriate to minimize take of the federally threatened loggerhead sea turtles, endangered green sea turtles, endangered leatherback sea turtles, and endangered hawksbill sea turtles.

1. Excavation activities must not occur from May 1 through October 31, the period of peak sea turtle egg laying and egg hatching, to reduce the possibility of crushing of sea turtle eggs, or nest excavation. During the May 1 through October 31 period, no construction equipment will be stored on the beach.

2. If the excavation project will be conducted during the period from March 1 through April 30, daily early morning surveys for loggerhead, green and leatherback sea turtle nests must be conducted from March 1 through April 30 or until completion of the project (whichever is earliest), and nests must be avoided.

2a. Nesting surveys will only be conducted by personnel with prior experience and training in nesting survey and egg relocation procedures. Surveyors must have a valid FWC permit. Nesting surveys must be conducted daily between sunrise and 9 a.m. Surveys must be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

3. The applicant must ensure that contractors doing the excavation work fully understand the sea turtle protection measures detailed in this incidental take statement.

4. If the excavation project will be conducted at night during the period from March 1 through April 30, nighttime surveys for leatherback sea turtle nests must be conducted from March 1 through April 30 or until completion of the project (whichever is earliest), and nests must be avoided.

4a. Nesting surveys will only be conducted by personnel with prior experience and training in nesting survey procedures. Surveyors must have a valid FWC permit. Nesting surveys must be conducted nightly from 9:00 p.m. until 6:00 a.m. The project area must be surveyed at 1-hour intervals (since leatherbacks require at least 1½ hours to complete nesting, this will ensure that all nesting leatherbacks are encountered).

5. If the excavation project will be conducted during daylight hours from March 1 through April 30, nighttime surveys for leatherback sea turtle nests are not required. All leatherback sea turtle crawls must be assumed to have resulted in nests if the nesting process has proceeded to or beyond the stage of the primary body pit. The entire area of disturbed sand plus a 10 foot buffer zone must be conspicuously marked. Neither the operation of equipment, nor the placement of fill, is permitted in the marked nest location. Any nests left in the active construction area must be clearly marked, and all mechanical equipment must avoid nests by at least 10 feet.

6. From March 1 through April 30, staging areas for construction equipment must be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities.

7. From March 1 through April 30, direct lighting of the beach and near shore waters must be limited to the immediate construction area and must comply with safety requirements. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (Figure 1).

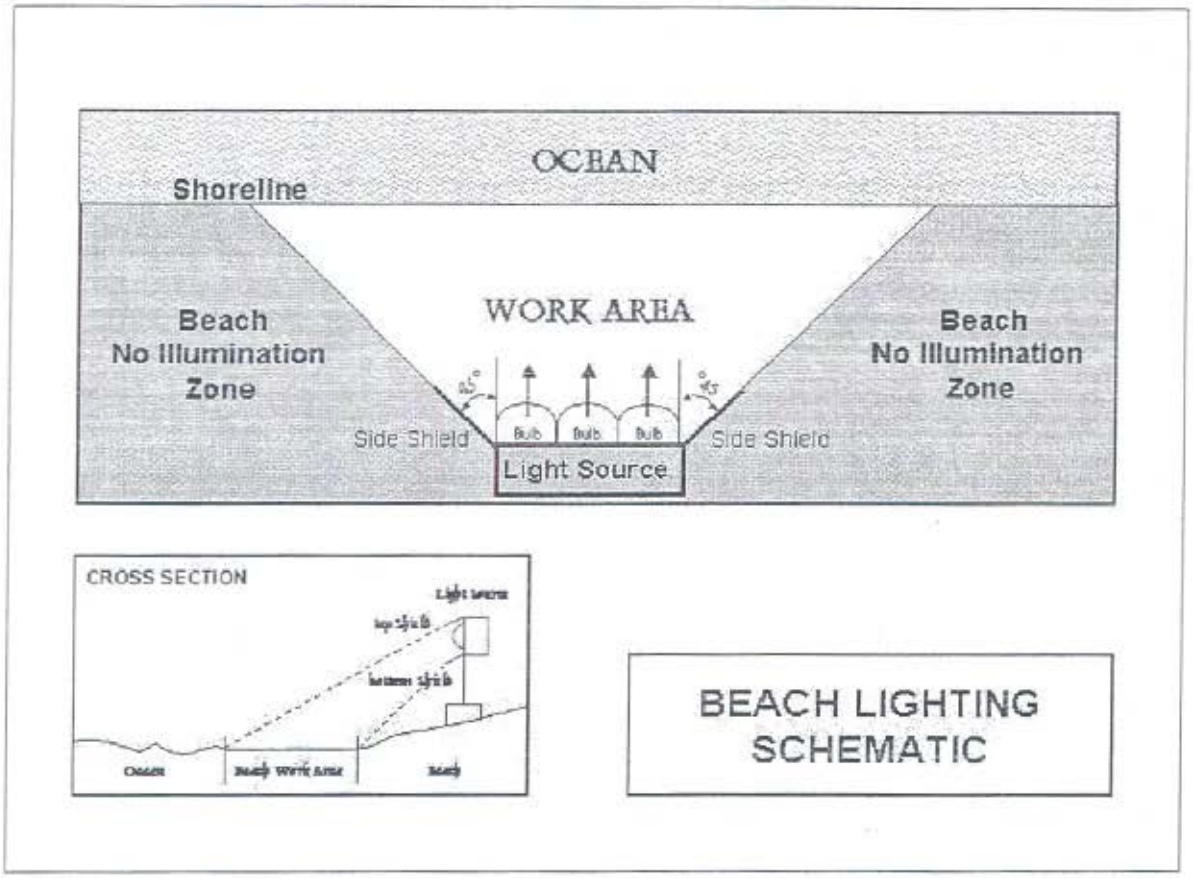

Figure 1. Lighting diagram.

STATUS OF THE SPECIES/CRITICAL HABITAT

SOUTHEASTERN BEACH MOUSE (*PEROMYSCUS POLIONOTUS NIVEIVENTRIS*)

Species/Critical Habitat Description

The southeastern beach mouse was listed as a threatened species under the Act in 1989 (54 FR 20598). Critical habitat was not designated for this subspecies.

Life History/Population Dynamics

The following account is from the South Florida Multi-Species Recovery Plan, Southeastern Beach Mouse Chapter (U.S. Fish and Wildlife Service 1999) and includes minor additions and changes to update the information.

Taxonomy

Peromyscus polionotus is a member of the order Rodentia and family Cricetidae. The southeastern beach mouse (SEBM) is one of 16 recognized subspecies of oldfield mice *P. polionotis* (Hall 1981); it is one of the eight of those subspecies that are called beach mice. The SEBM was first described by Chapman (1889) as *Hesperomys niveiventris*. Bangs (1898) subsequently placed it in the genus *Peromyscus*, and Osgood (1909) assigned it the subspecific name *P. polionotus niveiventris*.

Description

The SEBM is the largest of the eight recognized subspecies of beach mice, averaging 139 mm in total length (range of 10 individuals = 128 to 153 mm), with a 52 mm tail length (Osgood 1909; Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). Southeastern beach mice have pale, buffy coloration from the back of their head to their tail, and their underparts are white. The white hairs extend up on their flanks, high on their jaw, and within 2 to 3 mm of their eyes (Stout 1992). There are no white spots above the eyes as with *P. p. phasma* (Osgood 1909). Their tail is also buffy above and white below. Juvenile *P. p. niveiventris* are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

Habitat

Essential habitat of the SEBM is the sea oats *(Uniola paniculata)* zone of primary coastal dunes (Humphrey and Barbour 1981; Humphrey *et al.* 1987; Stout 1992). This subspecies has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980; Extine and Stout; 1987; Rich *et al.* 1993), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few meters.

Primary dune vegetation described from SEBM habitat includes sea oats, dune panic grass (*Panicum amarum*), railroad vine (*Ipomaea pes-caprae*), beach morning glory (*Ipomaea stolonifera*), salt meadow cordgrass (*Spartina patens*), lamb's quarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphor weed (*Heterotheca subaxillaris*) (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include beach tea (*Croton punctatus*), prickly pear cactus (*Opuntia humifusa*), saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), rosemary (*Ceratiola ericoides*), sea grape (*Coccoloba uvifera*), oaks (*Quercus sp.*) and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 1 km inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub several km from the beach habitat at Kennedy Space Center/Merritt Island NWR and CCAFS (Stout, personal communication, 2004). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

Within their dune habitat, beach mice construct burrows to use as refuges, nesting sites, and food storage areas. Burrows of *P. polionotus*, in general, consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 0.6 to 0.9 m, and the escape tunnel rises from the nest chamber to within 2.5 cm of the surface (Blair 1951). A beach mouse may have as many as 20 burrows within its home range. They are also known to use old burrows constructed by ghost crabs (*Ocypode quadrata*).

Foraging

Beach mice typically feed on seeds of sea oats and dune panic grass (Blair 1951). The SEBM probably also eats the seeds of other dune grasses, railroad vine, and prickly pear cactus. Although beach mice prefer the seeds of sea oats, these seeds are only available as food after they have been dispersed by the wind. Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhardt 1978). Beach mice will store food in their burrows.

Behavior

P. polionotus is the only member of the genus that digs an extensive burrow for refuge, nesting, and food storage (Ehrhart 1978). To dig the burrow, the mouse assumes a straddling position and throws sand back between the hind legs with the forefeet. The hind feet are then used to kick sand back while the mouse backs slowly up and out of the burrow (Ivey 1949). Burrows usually contain multiple entrances, some of which are used as escape tunnels. When mice are disturbed in their burrows, they open escape tunnels and quickly flee to another burrow or to other cover (Ehrhart 1978). Beach mice, in general, are nocturnal. They are more active under stormy conditions or moonless nights and less active on moonlit nights. Movements are primarily for foraging, breeding, and burrow maintenance. Extine and Stout (1987) reported movements of the SEBM between primary dune and interior scrub on Merritt Island, and concluded that their home ranges overlap and can reach high densities in their preferred habitats.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for *P. p. niveiventris* on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). This pattern is typical of other beach mice as well (Rave and Holler 1992).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980; Rave and Holler 1992). Blair (1951) indicated that beach mice are monogamous; once a pair is mated they tend to remain together until death. He also found, however, that some adult mice of each sex show no desire to pair. Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 4 to 6 cm in diameter. The nest comprises about one fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949).

The reproductive potential of beach mice is generally high (Ehrhardt 1978). In captivity, beach mice are capable of producing 80 or more young in their lifetime, and producing litters regularly at 26-day intervals (Bowen 1968). Litter size of beach mice, in general, ranges from two to seven, with an average of four. Beach mice reach reproductive maturity as early as 6 weeks of age (Ehrhart 1978).

Population Dynamics

Status and Trends

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats. On the Atlantic coast of Florida, the Anastasia Island beach mouse (*P. p. phasma*) and the SEBM were federally listed as endangered and threatened, respectively, in 1989 (54 FR 20602). One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*), was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Frank 1992).

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 280 km of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach

at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet SRA, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet SRA) (Humphrey *et al.* 1987; Robson 1989; Land Planning Group, Inc. 1991; Humphrey and Frank 1992; U.S. Fish and Wildlife Service 1993). The SEBM is geographically isolated from all other subspecies of *P. polionotus*.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (A. Sauzo, personal communication, 2004). Populations from both sides of Sebastian Inlet appear to be extirpated (A. Bard, personal communication, 2004).

The status of the species south of Brevard County is currently unknown. The surveys done during the mid-1990s indicate the distribution of this subspecies in the counties south of Brevard was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (D. Jennings, personal communication, 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. No beach mice were found during surveys in St. Lucie County and it is possible that this species is extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (U.S. Fish and Wildlife Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a pronounced affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation by domestic cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet SRA in Brevard County was completely extirpated by 1972, presumably by feral cats (A. Bard, personal communication 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

Beach mice along the Gulf Coasts of Florida and Alabama generally live about nine months (Swilling 2000). Field trapping research indicates that 68 percent (average) of mice alive in one month will survive to the next month. Actual survival rates indicate that 18.5 to 87 percent of individuals survive no more than four months and some mice live between 12 and 20 months (Blair 1951; Rave and Holler 1992). Holler *et al.* (1997) found that 44.26 percent of beach mice captured for the first time survived to the next season (winter, spring, summer, and fall). The mean survival rate for mice captured for a second time to subsequent capture was higher (53.90 percent). More than ten percent of mice survived three seasons after first capture, and four to eight percent survived more than one year after initial capture.

Mice held in captivity by Blair (1951) and at Auburn University (Holler 1995) have lived three years or more.

Analysis of the Species/Critical Habitat Likely to be Affected

The southeastern beach mouse was listed as an endangered species primarily because of the fragmentation, adverse alteration and loss of habitat due to coastal development. The above analysis shows three items that are essential for recovery of this species: (1) purchase of coastal dune habitat for preservation; (2) removal of predation or competition by animals related to human development (cats and house mice); and (3) increase the regulations regarding coastal development.

ENVIRONMENTAL BASELINE

Action Area

The action area for this biological opinion is defined as all habitat within the boundaries of CCAFS.

Status of the Species in the Action Area

The southeastern beach mouse is found along the entire reach of coastline on CCAFS in addition to the KSC and Cape Canaveral National Seashore. The known distribution is a result of cursory surveys and intermittent trapping involving different construction projects. There has not been a systematic trapping study done in order to determine the status throughout its range on these Federal lands. The species is found within the action area.

Factors affecting species environment within the action area

Federal actions have taken place within the action area that has impacted the southeastern beach mouse. These projects resulted in incidental take through section 7 of the Act. The impacts associated with these projects resulted in the loss of occupied habitat within the action area. However, the adverse effects of the southeastern beach mouse from these projects were off-set through on-site preservation and improvement of scrub habitat; resulting in a net increase in scrub habitat under active management. On CCAFS, southeastern beach mice have been located in the scrub habitat and further inland than in the coastal strand. Improvements to the management of scrub have increased the amount of habitat used by the southeastern beach mouse.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and its interrelated and interdependent activities. To determine whether the proposed action is likely to jeopardize the continued existence of threatened or endangered species in the action area, we focus on consequences of the proposed action that affect rates of birth, death, immigration, and emigration because the probability of extinction in plant and animal populations is most sensitive to changes in these rates.

Factors to be considered

The effects of the proposed project of the southeastern beach mouse may occur as direct and indirect effects.

Direct Effects

The excavation of the beach face and dune may result in the direct "take" of southeastern beach mice as a result of habitat loss. The project will result in the inadvertent injury or death of southeastern beach mice that may be found within the action area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur. The proposed project will permanently impact existing southeastern beach mouse burrows that may be found within the action area and temporarily impact beach mouse habitat within the action area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur.

Indirect Effects

Indirect effects will result from continued loss of foraging habitat for the southeastern beach mouse.

Cumulative Effects

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service has considered cumulative effects with respect to this project and determined they do not apply in this instance.

Conclusion

After reviewing the current status of the southeastern beach mouse, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of the southeastern beach mouse. No critical habitat has been designated for the three species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The Federal agency has a continuing responsibility to regulate the activity that is covered by this incidental take statement. If the agency (1) fails to assume and implement the terms and conditions or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the agency must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. (50 CFR 402.14(I) (3))

Sections 7(b) (4) and 7(o) (2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any State or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information for this species, information presented by the representatives for the agency, and based on our review; incidental take in the form of harm or harassment is anticipated for all the southeastern beach mice utilizing the dune assess points for rubble removal along the four segments of shoreline totaling 3,600 feet. If during the course of this action, this level of take is exceeded; such take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

When providing an incidental take statement the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measures are necessary and appropriate to reduce take:

1. Avoid potential for southeastern beach mice to be injured or killed by heavy equipment and the destruction of burrows.
2. Prior to hurricane season, trap mice within the action area and translocate them to suitable habitat within the Archie Carr National Wildlife Refuge. For subsequent excavations, in areas of suitable habitat, trap and relocate mice.
3. Rebuild the dune and vegetate using native plants. For subsequent excavations avoid this rebuilt dune area.
4. Fund a research project to determine the survivability of translocated mice.
5. Notify the Service of any unauthorized take of southeastern beach mice.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

1. The Air Force will follow the trapping protocol (copy attached) prepared by the Fish and Wildlife Service. Point 6 of the trapping protocol is modified as follows: "Trapping shall be done for five (5) consecutive nights just prior to work. If for some reason work is not initiated on the day following the fifth trapping night, trapping will be repeated for five consecutive nights following the above protocol."

2. The captured mice will be relocated using a "soft release" technique. The mice will be reintroduced on suitable habitat within the Archie Carr National Wildlife Refuge, where mice are currently extirpated.

3. The Air Force will fund a research project to investigate the survivability of the mice when translocated to the Archie Carr National Wildlife Refuge. The research project will include quarterly trapping for two years following the translocation event.

4. The dune will be rebuilt and vegetated with native plant species such as sea oats. The Air Force will not destroy this new primary dune during subsequent excavations.

5. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904)232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that all the southeastern beach mice utilizing areas of dune assess for the rubble removal project along the 3600 linear feet of shoreline will be incidentally taken. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to use their authority to further the purposed of the act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

1. The Air Force should fund a research project to determine the frequency with which mice repopulate the new dune.

2. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation measures.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. For further coordination please contact Ann Marie Maharaj at (904) 232-2580 ext. 111 of this office.

Sincerely,

David L. Hankla
Field Supervisor

Cc:
Joe Johnston-ES, Atlanta RO
Annie Dziergowski- Jacksonville Field Office

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TRAPPING PROTOCOL FOR BEACH MICE

1. Individuals conducting the trapping must have previous experience in live trapping, handling, and identification of small mammals.

2. Surveys must include the entire dune system within the project area and, if permission can be obtained, adjacent lands with beach mouse habitat. Trapping areas must include all suitable habitat types such as: frontal dunes, secondary dunes, scrub dunes, and dry flats behind dune systems, regardless of distance from the beach.

3. Trapping must be conducted along linear transects with live-traps spaced at 32.8 feet (10 to 15 meter) intervals. Linear transects should be parallel to the frontal dune system, and at least one transect should be placed in each habitat type.

4. Transects must extend the full length of each habitat type except where long blocks of habitat are involved ($\geq$ 2,640 feet/750 meters). In those cases, the habitat may be covered by several non-contiguous transects.

5. Two traps per trapping station are desirable, but one trap per station is acceptable.

6. Traps must be operated for five nights per trapping season or until a beach mouse is caught. At least three nights of trapping should be consecutive.

7. Traps must be checked and all mice released between 12 a.m. and thirty minutes after official sunrise time. All traps should be closed after checking and reset late each afternoon to preclude mortality of mice and other small mammals during the day.

8. When nighttime temperatures are forecast to be <15°C (60°F), a ball of cotton batting (or similar synthetic material) must be placed in each trap for insulation purposes. Trapping should not be conducted when nighttime temperatures are forecast to be <10°C (50°F), without prior coordination from the permitting agencies.

9. Trapping must not be conducted when the moon phase is three-quarters to full, if feasible.

10. Bait must consist of either long-cooking rolled oats, sunflower seeds or safflower seeds.

11. Each trap must be visually inspected before closing to assure no small mammals or other animals are inadvertently left in the trap.
12. Captured mice must be gently released on the ground near protective vegetation immediately adjacent to the trapping station.

13. Any exotic species captured during beach mouse trapping must be euthanized humanely.

14. Presence of beach mice can be documented in a single trapping period, but to determine absence with any degree of certainty will require multiple trapping periods. In that respect, trapping must be conducted seasonally (fall, winter, spring, summer) and in all dune habitats for at least two consecutive years or until mice are caught.

15. All traps must be individually numbered and labeled with identification of ownership.

16. Site description and trapping data must be recorded. The site description must include project location, habitat on the project area and adjacent lands, and trapping design relative to habitat distribution. Daily trapping data must include number of beach mice captured per day, non-target species captured, weather conditions, lost or missing traps, and moon phase. If population data is being collected, sex, age, and reproductive status of beach mice must also be reported. All information must be submitted to the following offices:

Protected Species Permit Coordinator
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street, Mail Station WLD-BLX
Tallahassee, Florida 32399-1600
(850) 921-5990
Fax (850) 921-1847

Terry J. Doonan
Regional Biologist
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
3377 East U.S. Highway 90
Lake City, FL 32055

Deputy Field Supervisor
U.S. Fish and Wildlife Service
6620 Southpoint Drive South, Suite 310
Jacksonville, FL 32216
(904) 232-2580
Fax (904) 232-2404

BREVARD County
BOARD OF COUNTY COMMISSIONERS

FLORIDA'S SPACE COAST

OFFICE OF THE COUNTY MANAGER
Brevard County Government Center, 2725 Judge Fran Jamieson Way, Bldg. C, Viera, FL 32940

Telephone: (321) 633-2010

September 7, 2000

Mr. Clay Gordin
Chief of Environmental Planning
45 CES/CEV
1224 Jupiter Street
Patrick Air Force Base, FL 32925-3343

Dear Mr. Gordin:

Brevard County Board of County Commissioners does not exert regulatory jurisdiction over Federally owned lands within Patrick Air Force Base or the Cape Canaveral Air Station. Therefore, no review by Brevard County is necessary for development activities on Federally owned lands within these installations.

If you would like additional information about this issue, please contact me.

Sincerely,

Peggy Busacca

Peggy Busacca
Assistant County Manager

/PAB